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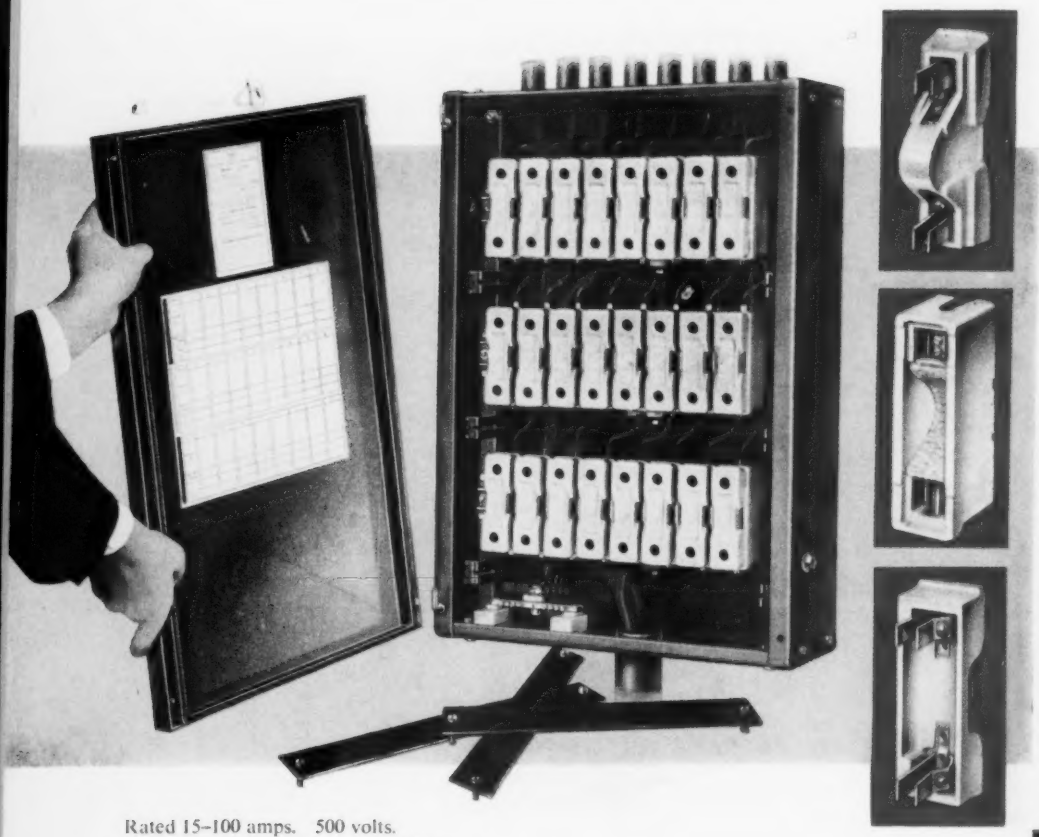

MEM

KANTARK
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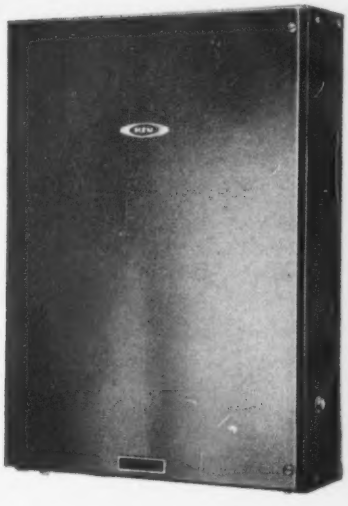
DISTRIBUTION
FUSEBOARDS

Rated 15–100 amps. 500 volts.
Entirely new design to B.S. 214/1959.



MEM's Kantark-Exel range takes distribution fuseboard design years ahead. Modern in styling, sound in performance, complying with British Standard Specifications, Kantark-Exel fuseboards simplify conduit erection, cable connection and neutral bar conversion. Moreover, they incorporate numerous advanced technical features.

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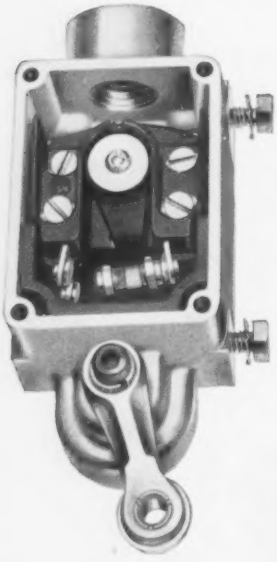
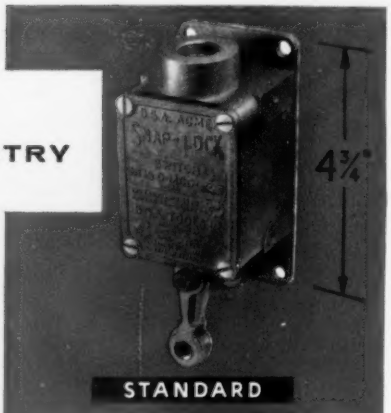


Two only replaceable assemblies in the electrical side: moulded one-piece contact block and arm. Interchangeable on all Mark II versions.

Water Oil and Dustproof or Flameproof versions

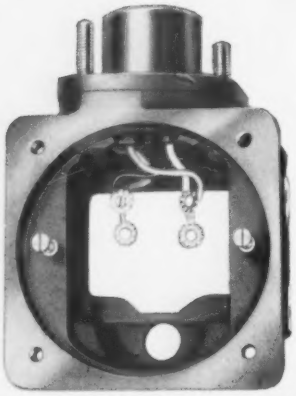


STANDARD

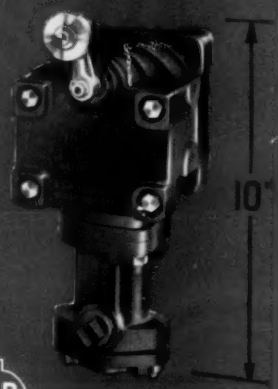
WATER, OIL & DUSTPROOF

Single pole, double break, double throw, operates with either circuit normally open with other closed, or maintaining in either position, or available with central (neutral) position and/or centre connection. Heavy aluminium die-cast case. Conduit ¾" B.S., or No. 3 Admiralty Pattern Cable gland entry. Two-screw side mounting or backplate mounting in two styles, or Tandem style (back to back mounting). Operating lever position adjustable in 7.5 deg. increments through 82.5 deg. either way from normal.

Standard Neutral position or Centre connection



The mechanism of the Flameproof switch is easily removable as a unit for servicing.

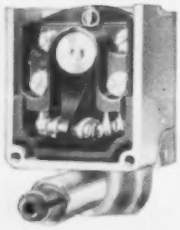


FLP FLAMEPROOF

SINGLE OR DOUBLE ENTRY

Buxton certificates No. 3574 (Group I) No. 3575 (Groups II and III gases). Meehanite iron castings. Self wiping solid silver contacts, interchangeable plugs and sockets. ***Single SWA cable entry (standard); double entry if required.*** *Operating lever position adjustable in 7.5 deg. increments through 360 degs. Single pole, double break, having one normally closed and one normally open circuit. Available with central (neutral) position and/or centre connection.*

MARK II

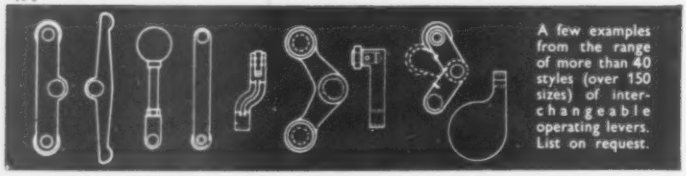


B.S.A. SNAP-LOCK ACME

Catalogue of switches and levers on request

HEAVY DUTY LIMIT SWITCHES

471



A few examples from the range of more than 40 styles (over 150 sizes) of interchangeable operating levers. List on request.

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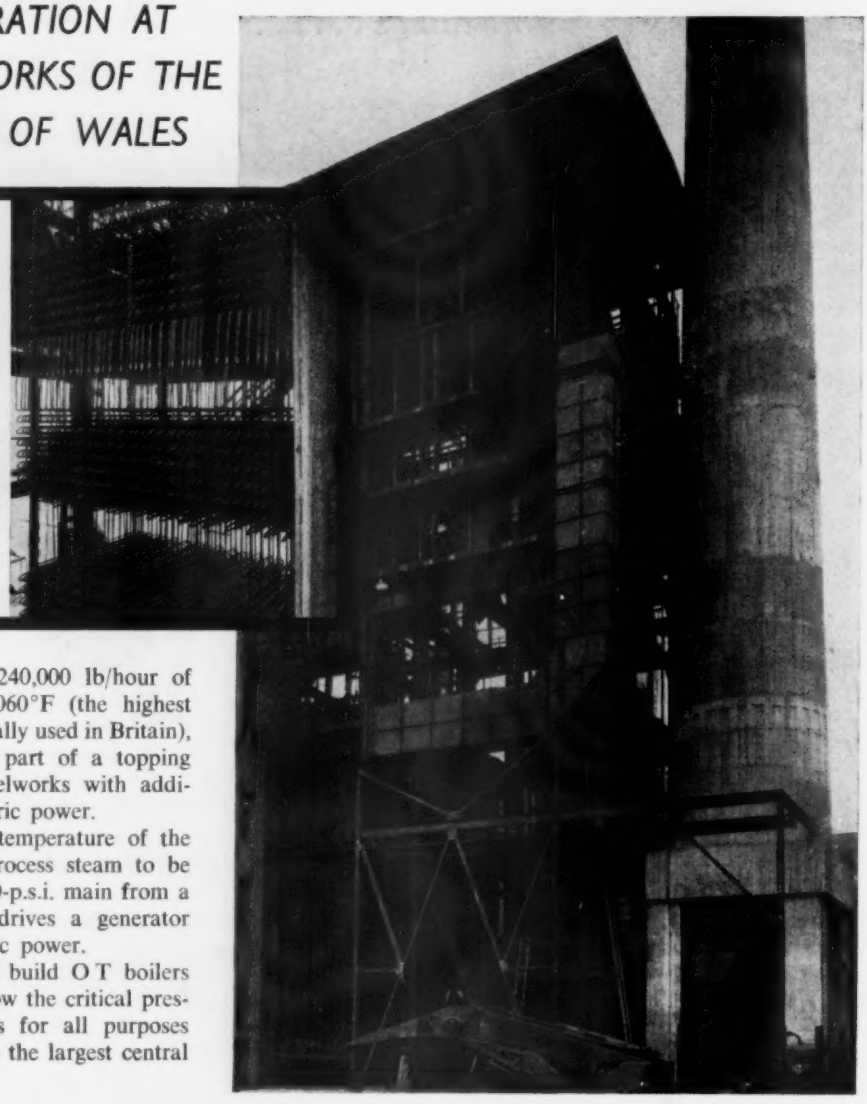
IS NOW IN OPERATION AT THE MARGAM WORKS OF THE STEEL COMPANY OF WALES



Main illustration. *A general view of the boiler under construction. This is an outside job, but the operating front is housed in the turbine building.*

Inset illustration. *This close-up of the top three banks of the evaporator, taken before the chamber walls were fitted, shows the type of evaporator surface.*

This O T boiler, generating 240,000 lb/hour of steam at 3,300 p.s.i. and 1,060°F (the highest steam conditions yet commercially used in Britain), with reheat to 840°F, forms part of a topping installation to supply the steelworks with additional process steam and electric power.

The extra-high pressure and temperature of the initial steam supply enable process steam to be exhausted into the existing 600-p.s.i. main from a back-pressure turbine which drives a generator producing 9,500 kW of electric power.

Simon-Carves can design and build O T boilers for operation above, at or below the critical pressure, with steaming capacities for all purposes from small industrial plants to the largest central power stations.

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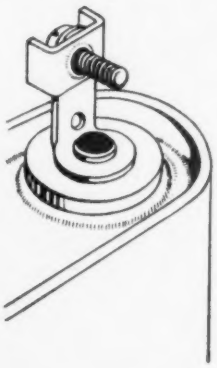
- **If required, a screw and "U" clamp can be fitted at extra cost. (See diagram).**

★ *As streamlined as the tube itself.*



SPECIFICATION

Test Voltage:
Capacitors. Up to and including 250 volts A.C. = Wkg volts x 2
above 250 volts A.C. = Wkg volts x 2.5
D.C. Test = A.C. Wkg volts x 3
To Earth, A.C. wkg volts + 1,000 volts A.C. or 2,000 volts A.C. min
Sealing Test: Each Capacitor is heat tested at 80 C
Capacitance Tolerance: Standard limits as shown. Others by arrangement
Power Factor: Better than 0.3% at working volts at 30 C

TYPE L89/1 STANDARD RANGE

Capacitance μF	Volts A.C. wkg.	List No.	Dimensions—inches	
			Length	Cross section of all units
3.2 min	250	ZG101	2	2.148 x 1.398
4 min	250	ZG102	2½	
5 min	250	ZG103	2⅝	
6 min	250	ZG104	3	
7.4 min	250	ZG105	3½	
3.5±5%	400	ZG106	3¾	
6.8±5%	400	ZG107	5¾	

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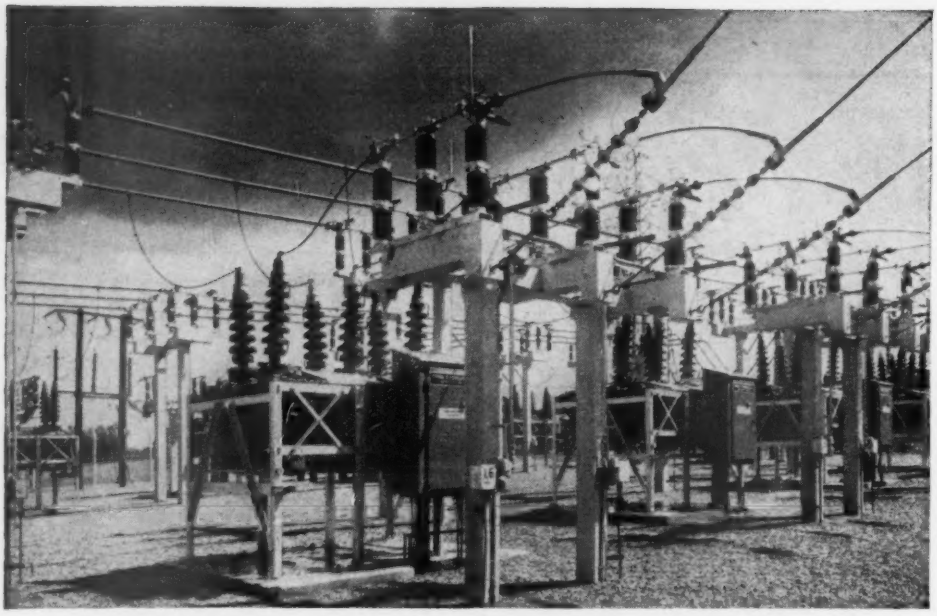

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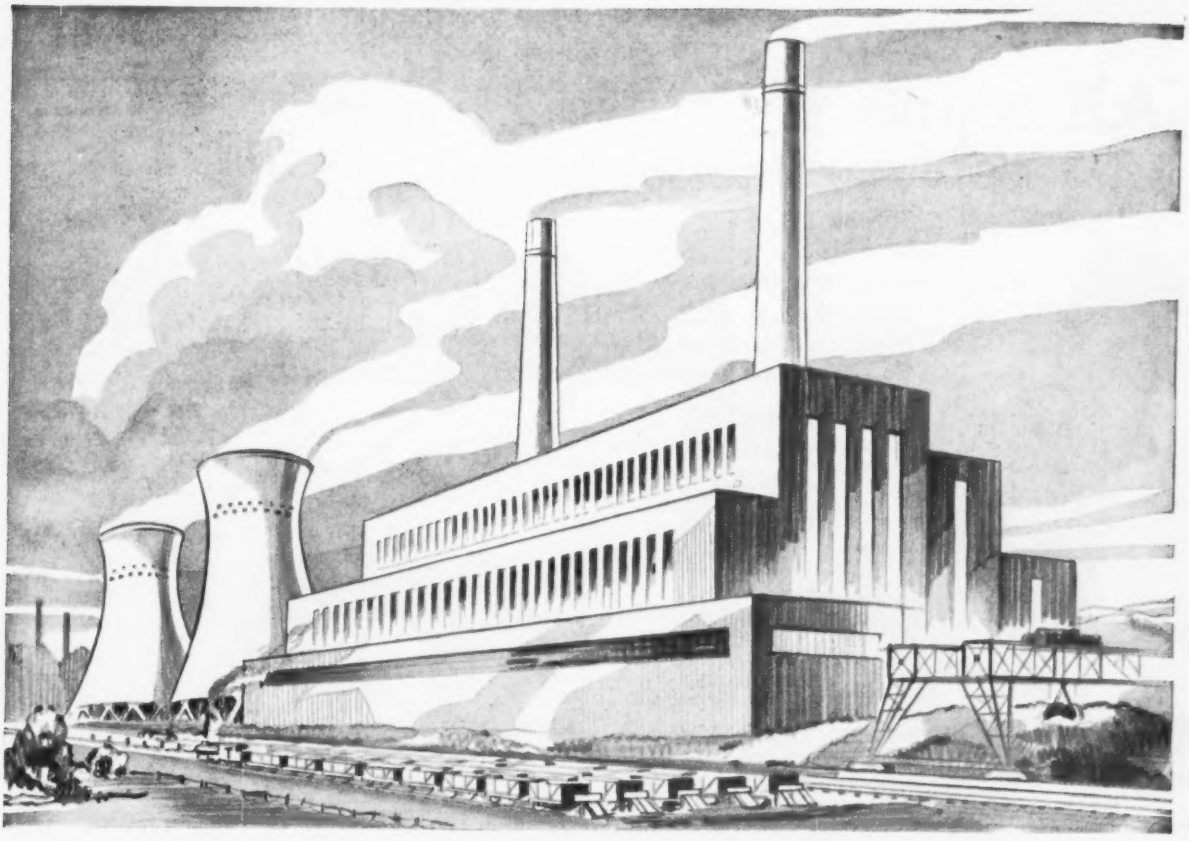

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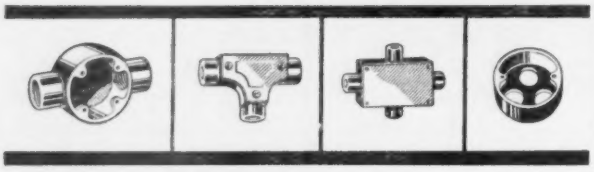

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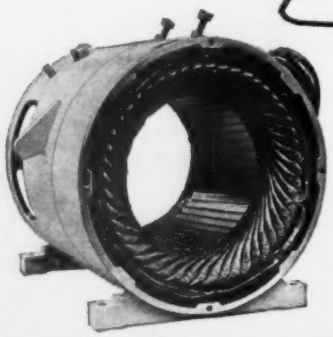

On Stand No. W.1 at the Electrical Engineers Exhibition a short film will show a few of the many ways in which MINERVA insulating products meet the most exacting requirements set by the Electrical Industry. Pinchin Johnson representatives will be waiting to welcome our many friends and to give advice on the innumerable uses of our insulating specialities.

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1 SIMPLICITY

All Dubilier Power Factor Correction Capacitors are manufactured on the unit construction principle. Pioneered by Dubilier more than 30 years ago, this method is acknowledged to be the simplest and most effective form of construction. It allows for a large degree of flexibility as units may be removed or added to meet periodic variations in the reactive load.

2 SAFETY

Dubilier Duconol-impregnated Power Factor Correction Capacitors are made with an impregnant which is completely non-inflammable, therefore fire risk is entirely eliminated.

3 LONG LIFE

Dubilier Duconol-impregnated Power Factor Correction Capacitors have an exceptionally long life. This is because the high dielectric constant of Duconol closely matches that of the cellulose in the Kraft dielectric thus eliminating the large potential differences commonly encountered. The resulting voltage gradient between the electrodes is virtually a straight line and impregnant polymerization cannot occur.

5 SPACE SAVING

The high efficiency of unit-constructed Dubilier Power Factor Correction Capacitors results in a reduced size per kVAr. This saves valuable floor space and in many cases it is possible to mount capacitors of up to 200kVAr on the walls or cross members of buildings.

6 EFFICIENCY

The small size of Dubilier Duconol-impregnated Power Factor Correction Capacitors represents a remarkable technical advance. The dielectric constant of Duconol is between 5 and 6 and a dielectric efficiency of not less than 99.7% at 50°C. is obtained. The reduction in size is thereby achieved without affecting the safety factor.

7 APPROVED SPECIFICATIONS

Dubilier Duconol Power Factor Correction Capacitors can be used with complete confidence. They meet the requirements of the latest British Standard Specification No: 1650 and the specification of the National Electrical Manufacturers' Association of America. They are also approved by the Canadian Standards Association.

When you use Dubilier Power Factor Correction Capacitors you take advantage of a vast fund of knowledge and experience. Dubilier capacitors are backed by over 30 years of research and development in design and production techniques. Behind every Dubilier product is a name of standing, a first-class manufacturing organisation and a team of highly qualified engineers whose advice is yours for the asking.

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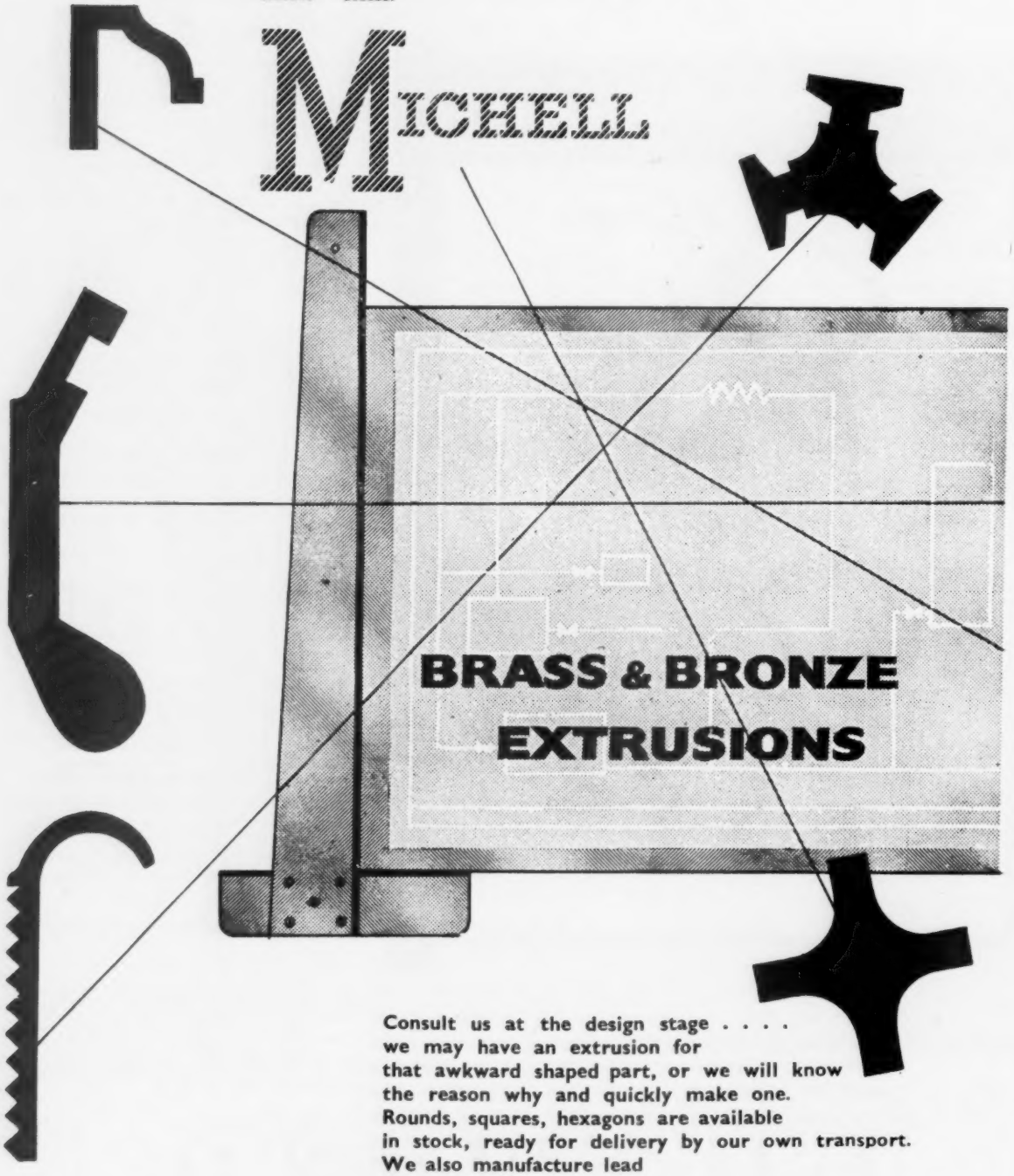

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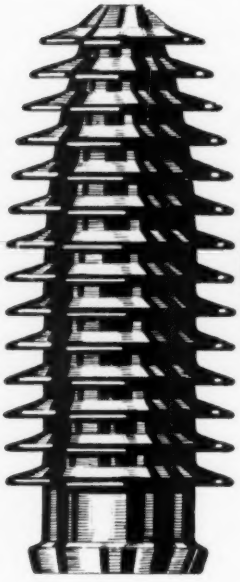

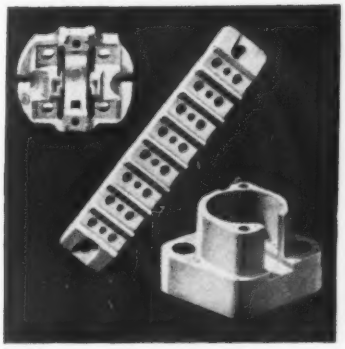

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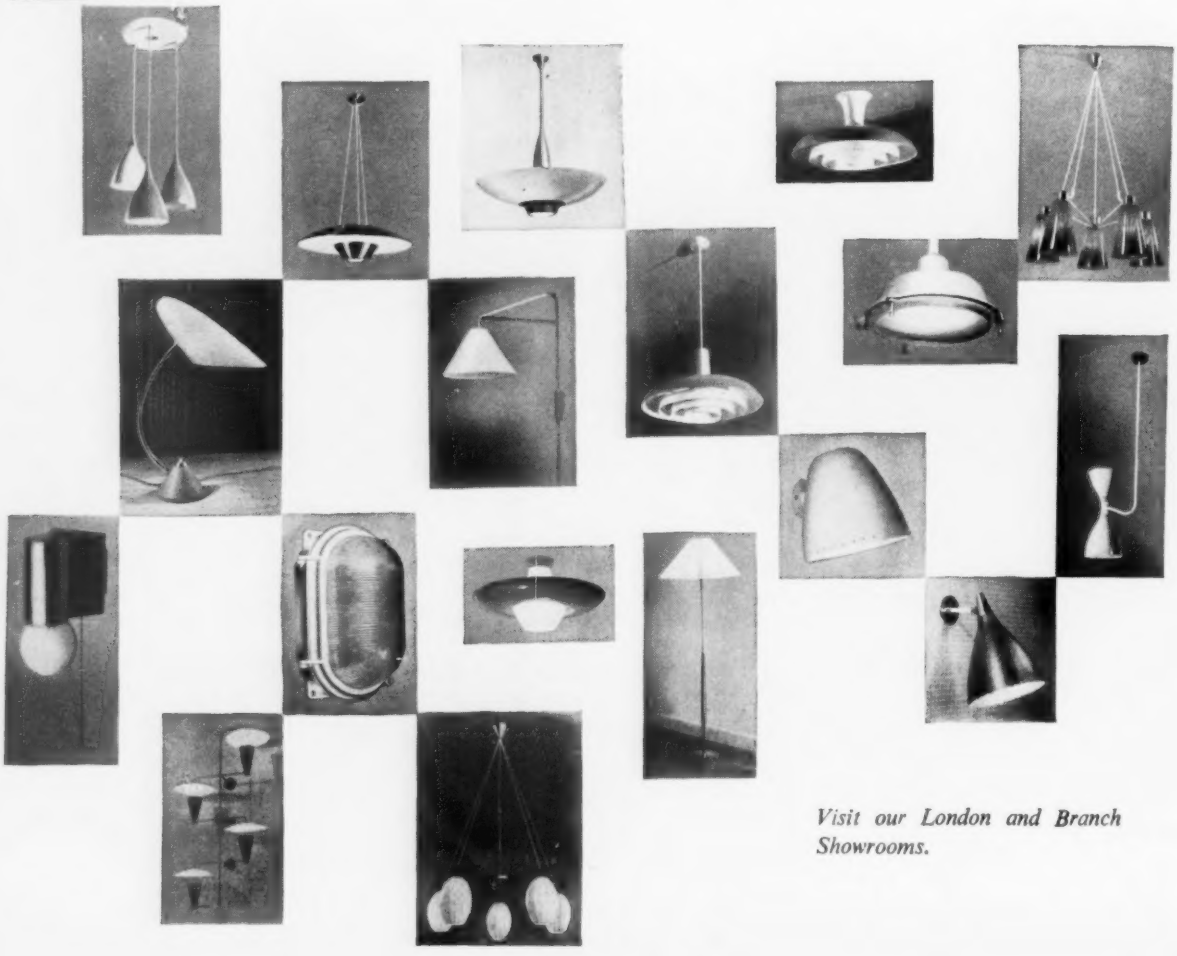

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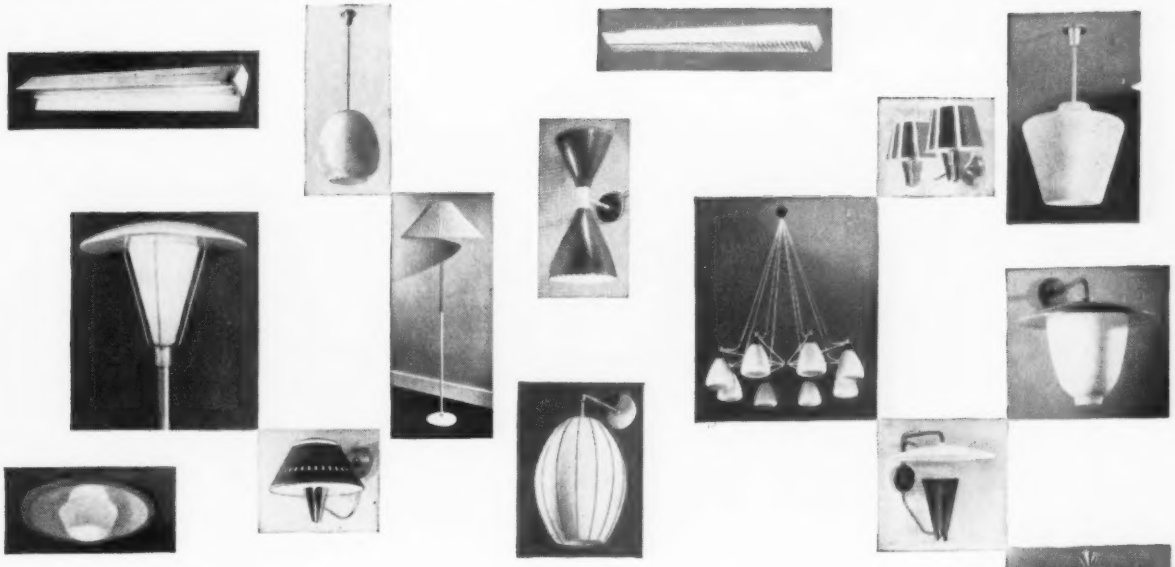
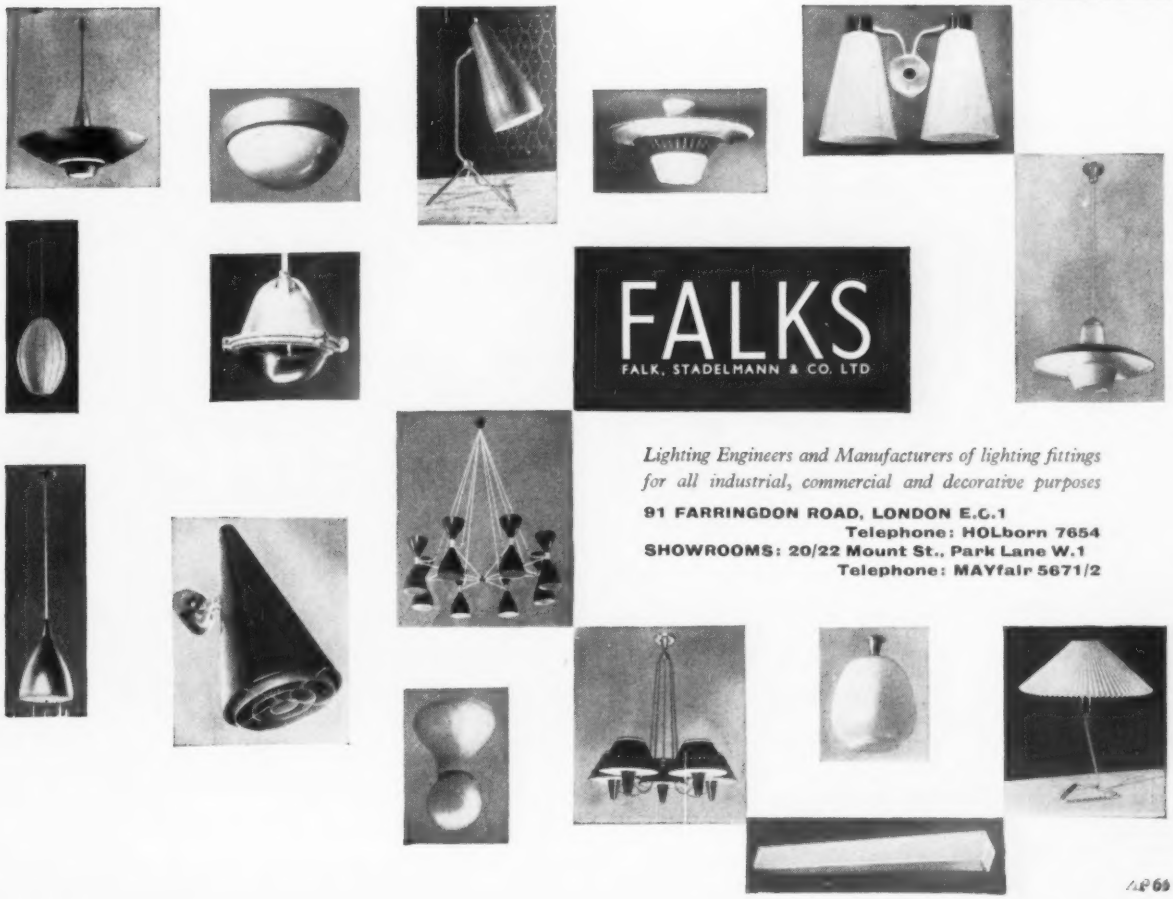


. . . industrial . . . commercial . . . domestic



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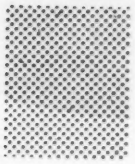
AP 66

WHY INDUSTRY IS CHANGING TO CLASS C AND CLASS H TRANSFORMERS

THEY ARE FAR BETTER



Class C & Class H *silicone-insulated, dry-type transformers are fire and explosion proof. They are not affected by dust and humidity. And because they will withstand repeated overloading, rating does not have to be based on peak loads. For safety, reliability and low maintenance costs, silicone-insulated transformers hold every advantage.*

Find out all about silicone insulation at our stand at the Electrical Engineers' A.S.E.E. Exhibition

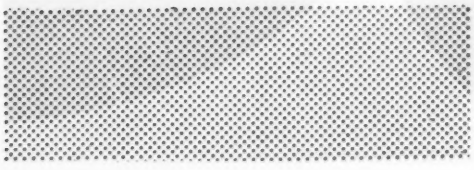
Stand K22

THEY ARE OFTEN CHEAPER

First consider all the expenditure incumbent upon the installation of oil-filled transformers. Special bunkers and fireproof vaults are usually needed—and special fire-fighting equipment. The installation is often located a considerable distance from the load centre—which implies expensive low-voltage cable runs.

Now consider the very considerable cost-cutting advantages of Class C and Class H transformers as demonstrated for instance at the Kent factory of Medway Paper Sacks Ltd, a member of the Reed Paper Group. Here a 750 kVA 3-phase air natural cooled transformer, built by Ferranti Ltd, has been neatly mounted within the roof truss space. Space limitations—making it undesirable to build an adjoining substation for a Class A unit—together, of course, with freedom from fire hazard, were the major considerations. As a Group technician pointed out, the transformer's low weight enabled it to be sited thus, on a moderately-sized platform, making it possible to run 'a very nice low voltage distribution' to individual machines without floor excavations to accommodate long, costly cable runs.
And so, in simple indisputable terms, it often costs less to have all the advantages of a Class C or a Class H installation.

Midland Silicones Ltd supply the silicone resins and elastomers used in the manufacture of Class C and Class H transformers. Here is a list of well-known British manufacturers producing silicone-insulated dry-type transformers for the United Kingdom and overseas.



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Brentford Transformers Ltd
Brush Electrical Engineering Co Ltd
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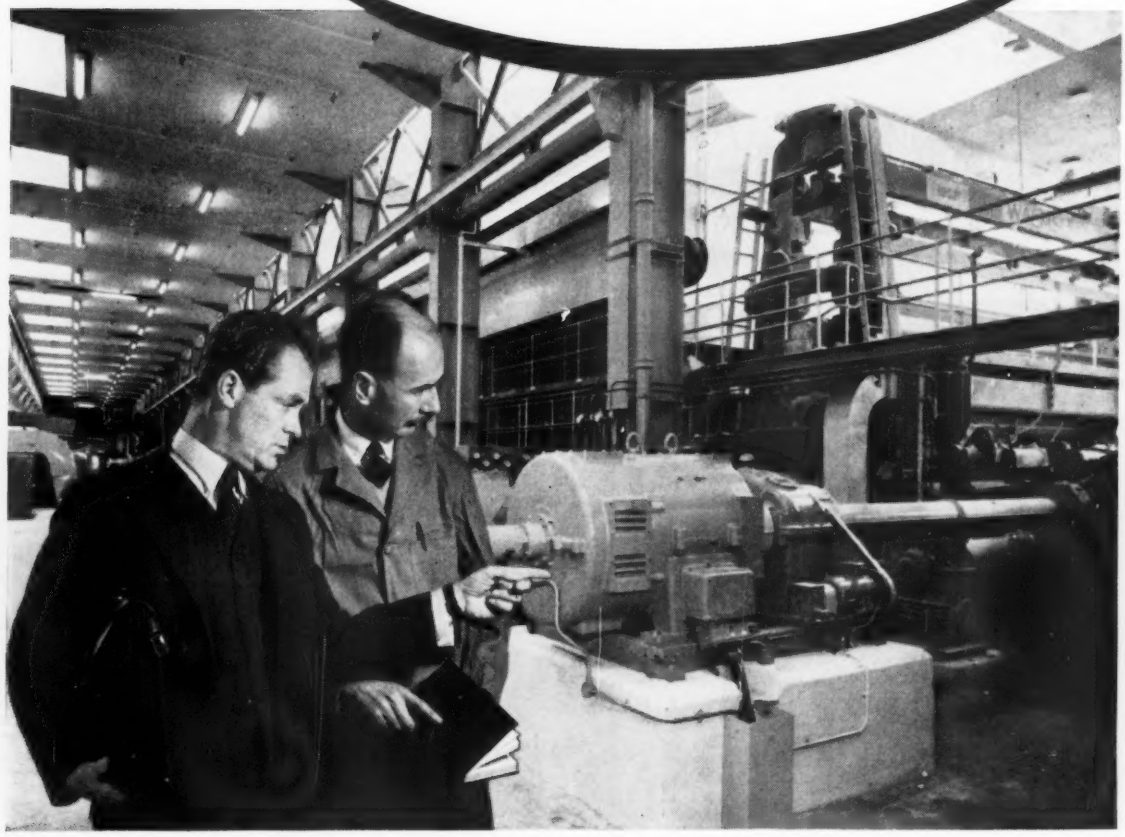

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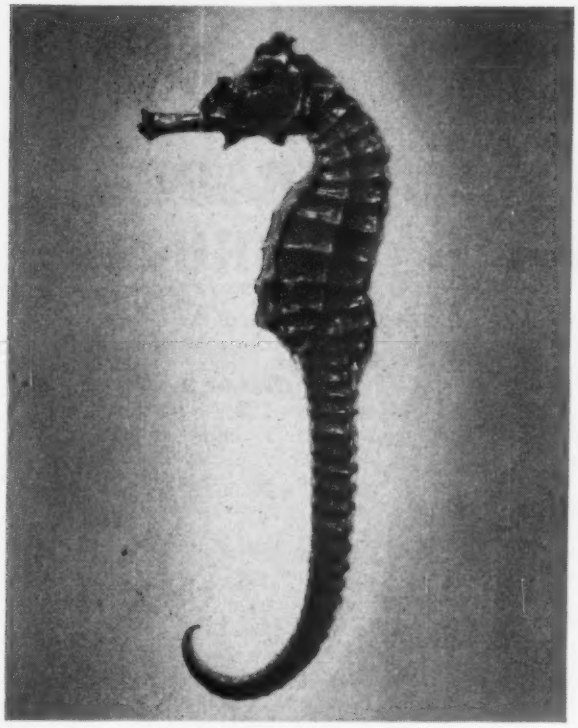

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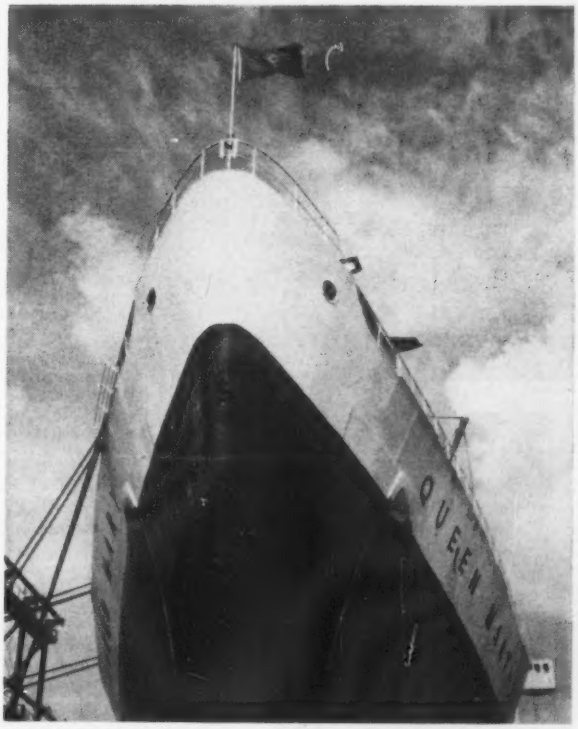

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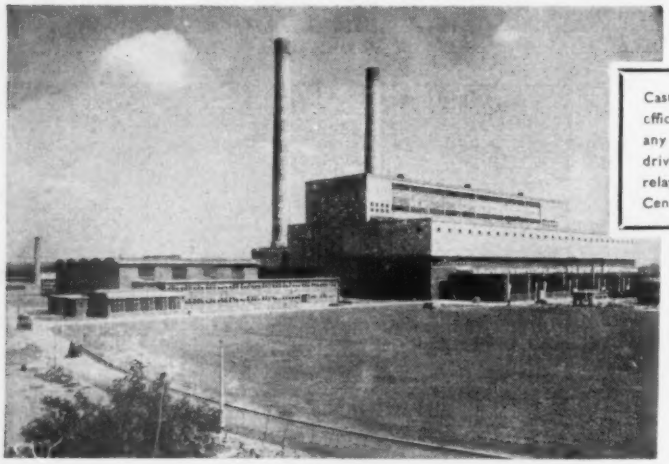

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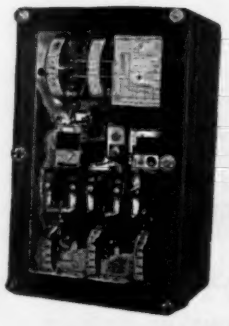

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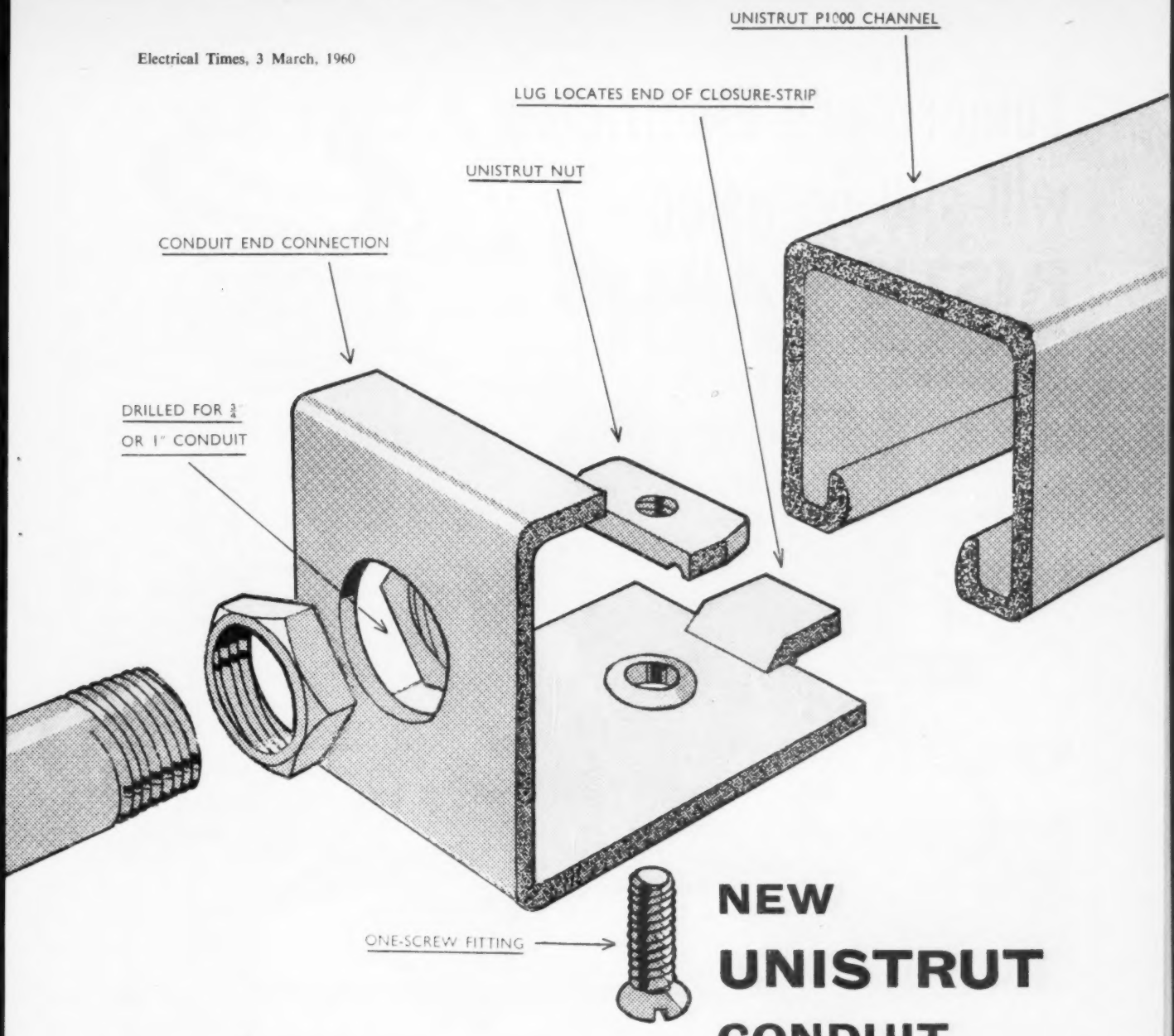

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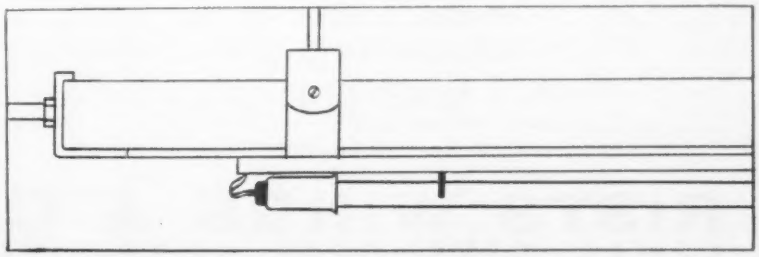

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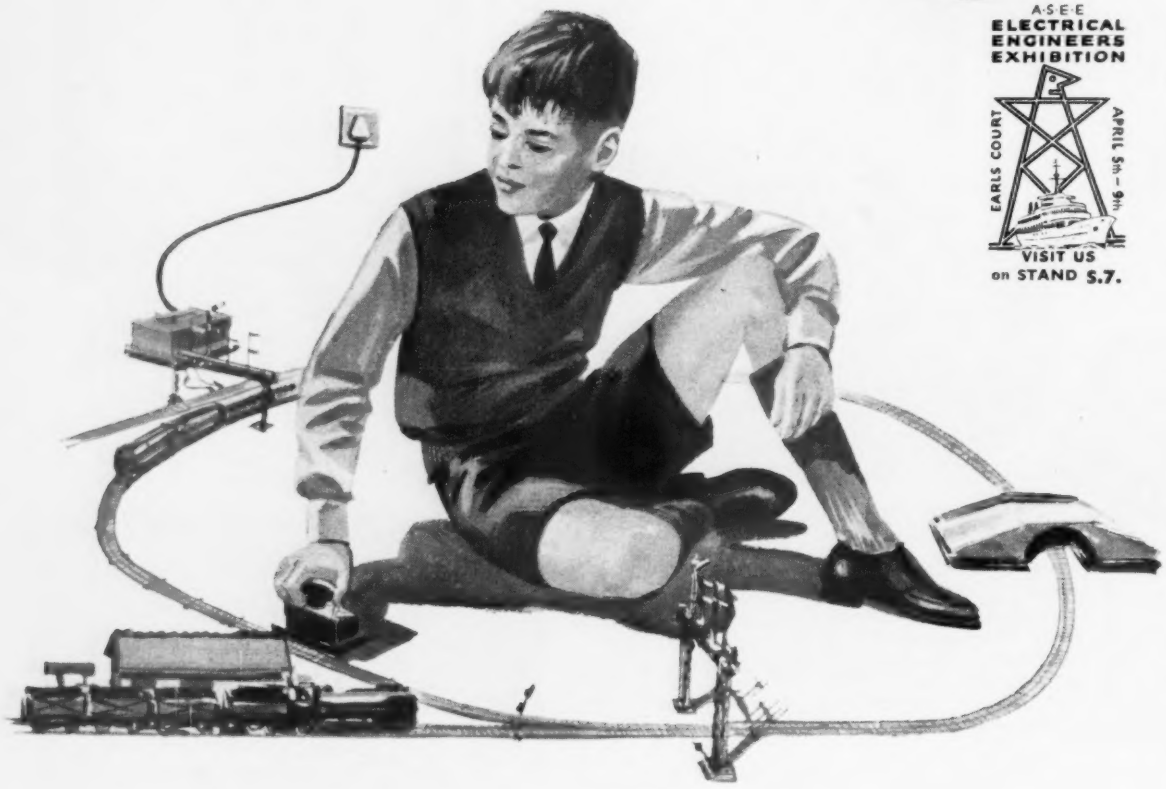

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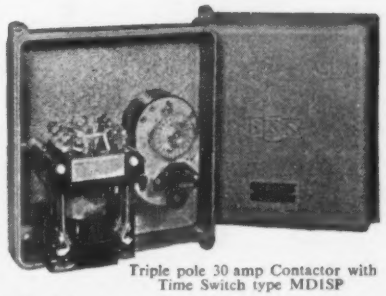

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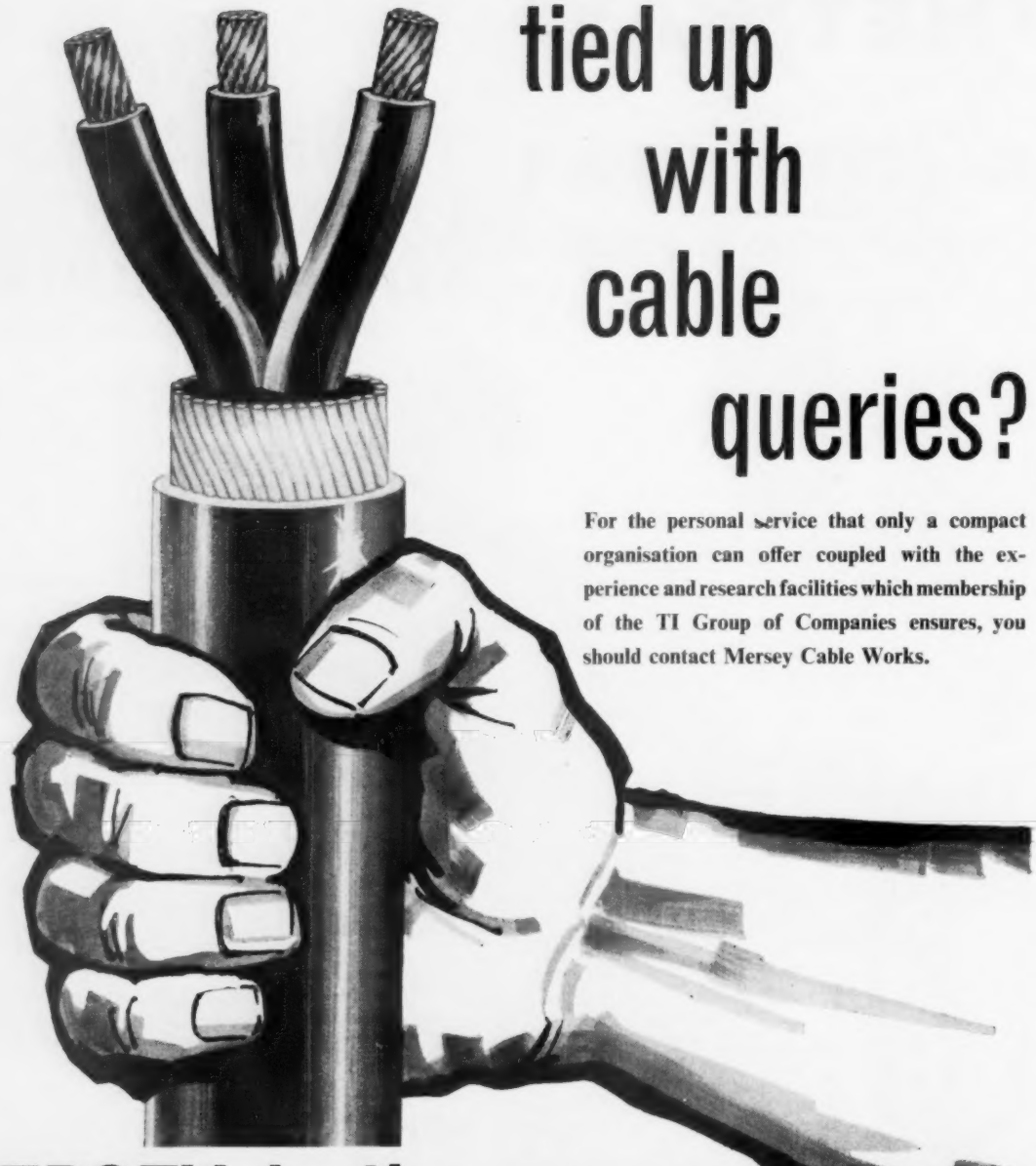

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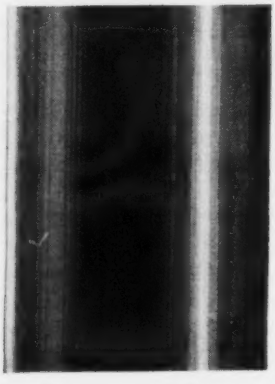

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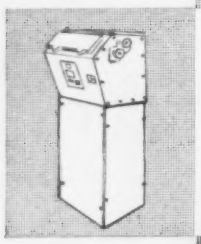
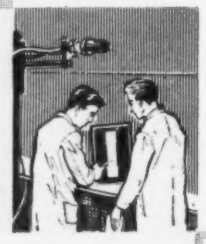
Purpose



Suitable for use in H.V. fuse-switches requiring a 10" × 2½" oil-immersed cartridge fuse-link fitted with striker-pin tripping-device.

Manufacture



Every stage of manufacture is subject to careful quality control to ensure, amongst other things, complete oil-tightness. All fuse-links are checked by X-ray examination during and after assembly.

Type Test Data

RATING		BREAKING-CAPACITY	A.S.T.A. CERTIFICATE NO:
CURRENT(amps)	VOLTAGE (kV)		
60	6·6/11	250 mVA at 11 kV	3866
60	6·6/11	250 mVA at 6·6 kV	3976
60	6·6/11	150 mVA at 6·6 kV	3977
60	3·3	75 mVA at 3·3 kV	4013
100	3·3	75 mVA at 3·3 kV	4061

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NEWS SHEET

Establish the term "chartered engineer" suggests IEE president Sir Willis Jackson; drop the specialist tag. Intention is to create image of professional man in public's mind. Initially only electricals, civils, mechanicals and chemicals would be involved. (327, 332)

Silicon triode controls 25 amps, mean half-wave current with only 50 mA signal. Semiconductor *p-n-p-n* device offers fast switching, low loss; may revolutionise power control techniques. (328, 335)

Prototype of domestic semiconductor refrigerator to be shown in photo display at first EDA Conference exhibition next week. Review of domestic electric equipment covers models displayed at Harrogate and at Ideal Home exhibition. (327, 338)

6% increase in tariffs by S. Scotland EB. Rises in domestic, farm, catering, general block and public lighting tariffs. Off-peak rates may be reduced (358)

Electricity authorities not giving full weight to countryside beauty provisions of 1957 Electricity Act, alleged in House of Lords debate. Lord Citrine points out over one-quarter of countryside is marked as of special beauty. (356)

Smethwick and West Bromwich districts to be merged in Midlands EB, on retirement of district manager, G. Fisher. (347, 358)

In new company acquisitions and arrangements; Harper Engineering and Electronics take-over Micalectric, J. and S. Newman, C. D. Monninger, and Mills and Brain. Goblin (BVC) have purchased old-established business. Alwyn Holdings buy for £31,160 cash a lighting fittings firm. EMI Electronics link with US Fairbanks Whitney Corp. Lucas and Chloride form British Batteries Overseas Ltd. to manufacture abroad (355) . . . Efco joins with Stein and Atkinson. (356)

25 kV traction supply safe for public and BR staff; adequacy of clearances and safety rules demonstrated to officials of trade unions and Transport Commission. (350)

PEOPLE—J. W. K. Evans leaving SEB to be secretary, N. Western EB . . . A. E. Strong becomes deputy chief engineer in E. Midlands EB reorganisation . . . R. E. Landsbert appointed a director, Marryat and Scott . . . T. D. Childs becomes Scottish manager, Dorman and Smith and D.S. Plugs . . . New directors of Hoover subsidiaries are H. D. Vigers and C. J. Hodges (electric motors), F. A. Austin and H. J. Furness (washing machines) . . . K. A. Fillmore becomes div. sales manager, Leigh Works, BICC . . . H. J. Stone (BICC), F. C. Fenton (ex-LEB) and D. A. V. Rist die. (346, 348)

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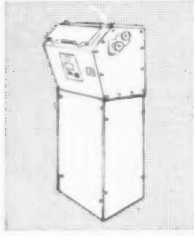

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NEWS SHEET

Tests on electric water heaters and spray taps for hand washing show restricted-flow type non-pressure heater best from cost and convenience. (329)

£9 spin dryer; £4 6s vacuum cleaner, are among German appliances being offered ex-warehouse, ex-purchase tax, leaving retailers to fix selling prices. (355)

Ideas for relieving boredom in nuclear control rooms provided for GEC by US team of ergonomics consultants. Reactor simulator suggested as means of keeping up training in emergency operation of reactor. (328, 359)

First Berkeley refuelling machines nearing completion at John Thompson factory. Machines designed to locate and remove irradiated fuel elements by remote control. (331)

Butyl-rubber cables used for Australian distribution scheme. Higher working temperature reason for preference to p.v.c. Steel ducts used in sand; under-road drilling adopted. (336)

Electrical exports jump to £24.1m. in January. All-round rise includes £1m. submarine cable for US. Imports also well up; over £218,000 for domestic refrigerators. (354)

Lower steam turbine wetness loss would upset economics of reheat, higher temperatures and pressures. I.Mech.E. studies present practice, discussion emphasises severe erosion conditions on blades. (343)

New materials and components for designers shown at first engineering design exhibition. Special bearings featured and new corrosion resistant surface for aluminium. (349)

Coal industry to offer packaged h.p. deal for central heating; operating through dealers and heating engineers. (328)

BUSINESS—One-for-one scrip issue by Hoover and Morphy-Richards and one-for-five at 3s by Bylock . . . Hoover's profit almost doubled at £11·1m. . . . Increased profits also by Rheostatic Co. and M.E.M. but reduction for Clarke, Chapman . . . Lord Nelson (E.E. Co.) warns of low profit margins, particularly in export markets. (361)

OVERSEAS—GEC get £1·4m. generating plant order from Johannesburg . . . India planning super-grid system in stages . . . Pakistan considering using peat for power generation . . . Australia estimates spending £500m. on generating plant in next 10 years . . . Export-Import bank loan $14·3m. to Indonesia for 50 MW steam power station . . . 17·3% increase in unit sales by Salisbury (S. Rhodesia) during year of trade recession. (344, 345)

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NEWS SHEET

Tests on electric water heaters and spray taps for hand washing show restricted-flow type non-pressure heater best from cost and convenience. (329)

£9 spin dryer; £4 6s vacuum cleaner, are among German appliances being offered ex-warehouse, ex-purchase tax, leaving retailers to fix selling prices. (355)

Ideas for relieving boredom in nuclear control rooms provided for GEC by US team of ergonomics consultants. Reactor simulator suggested as means of keeping up training in emergency operation of reactor. (328, 359)

First Berkeley refuelling machines nearing completion at John Thompson factory. Machines designed to locate and remove irradiated fuel elements by remote control. (331)

Butyl-rubber cables used for Australian distribution scheme. Higher working temperature reason for preference to p.v.c. Steel ducts used in sand; under-road drilling adopted. (336)

Electrical exports jump to £24.1m. in January. All-round rise includes £1m. submarine cable for US. Imports also well up; over £218,000 for domestic refrigerators. (354)

Lower steam turbine wetness loss would upset economics of reheat, higher temperatures and pressures. I.Mech.E. studies present practice, discussion emphasises severe erosion conditions on blades. (343)

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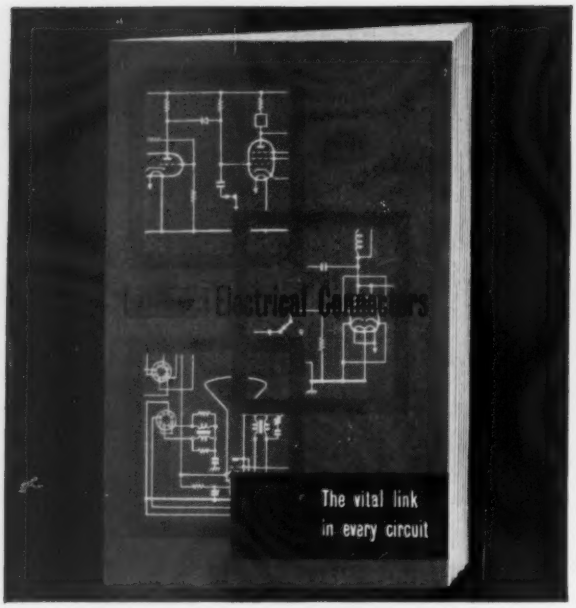

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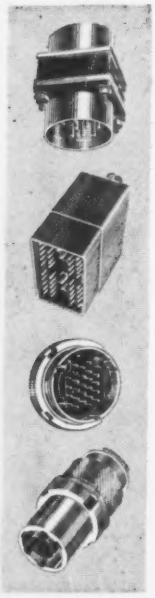

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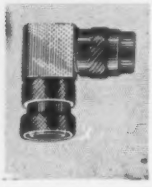

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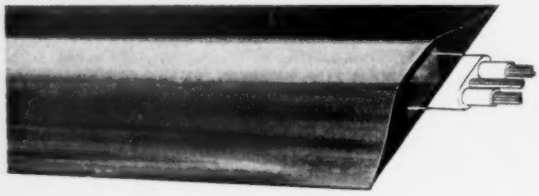

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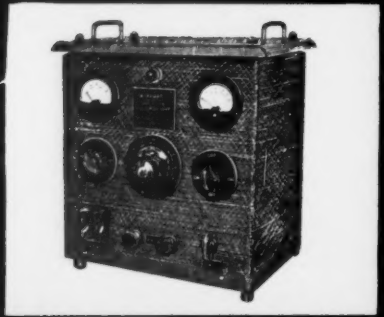

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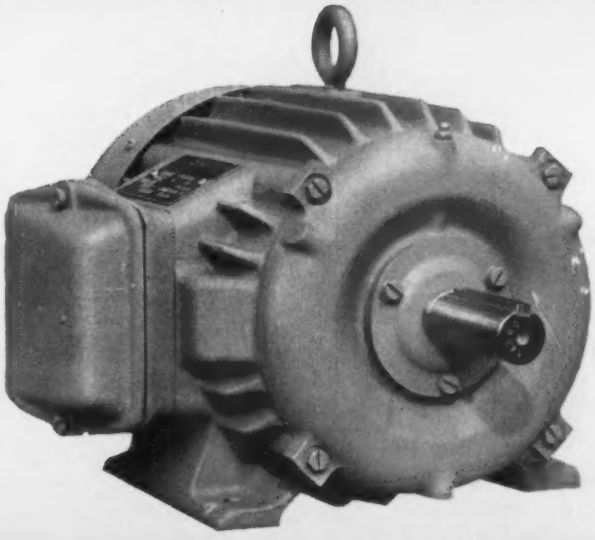

348

BY G.E.C.

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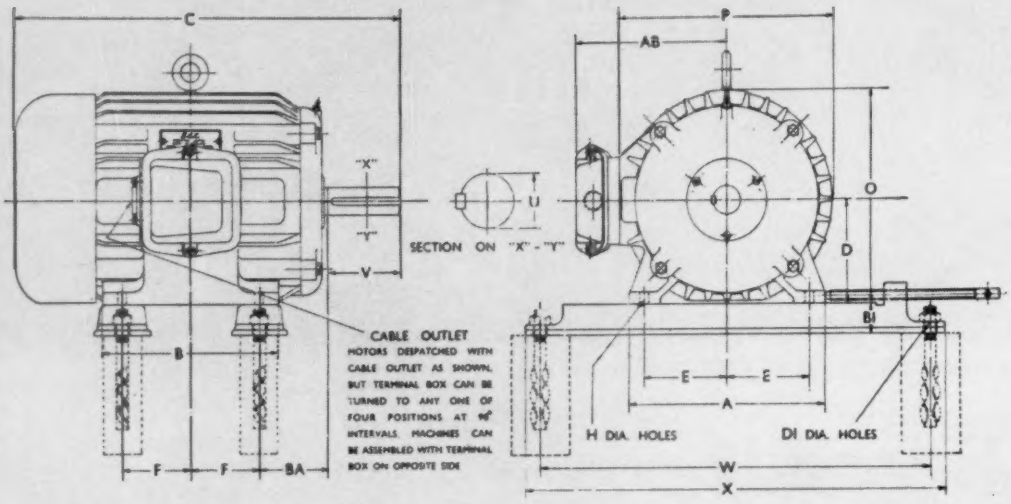
(with class 'E' insulation)

RATINGS AND DIMENSIONS



H.P.		Frame Size	Frame											Shaft Extension		Slide Rails			
1,500 r.p.m.	1,000 r.p.m.		A	AB	B	BA	C	D	E	F	H	O	P	U	V	W	X	BI	DI
1	½	D162	8	6½	5¼	2⅜	13 5/16	4	3⅜	2	⅜	8 1/16	8⅛	·7500	2¼	20 3/32	21 11/32	1 9/16	¾
1½	¾	D164	8	6½	6½	2⅜	14½	4	3⅜	2½	·⅜	8 1/16	8⅛	·7500	2¼	20 3/32	21 11/32	1 9/16	¾
2	1	D182	9	7 1/16	6	2⅜	14⅜	4½	3⅜	2½	7/16	9 1/16	9⅛	1·1250	3	20 3/32	21 11/32	1 9/16	¾
3	2	D184	9	7 1/16	7	2⅜	15⅜	4½	3⅜	2⅜	7/16	9 1/16	9⅛	1·1250	3	20 3/32	21 11/32	1 9/16	¾
5	3	D213	10⅛	7⅞	7½	3½	18 9/32	5¼	4¼	2⅜	7/16	10⅜	11 1/32	1·3750	3⅜	20 3/32	21 11/32	1 9/16	¾
7½	5	D215	10⅛	7⅞	9	3½	19⅜	5¼	4¼	3½	7/16	10⅜	11 1/32	1·3750	3⅜	20 3/32	21 11/32	1 9/16	¾

G.E.C.

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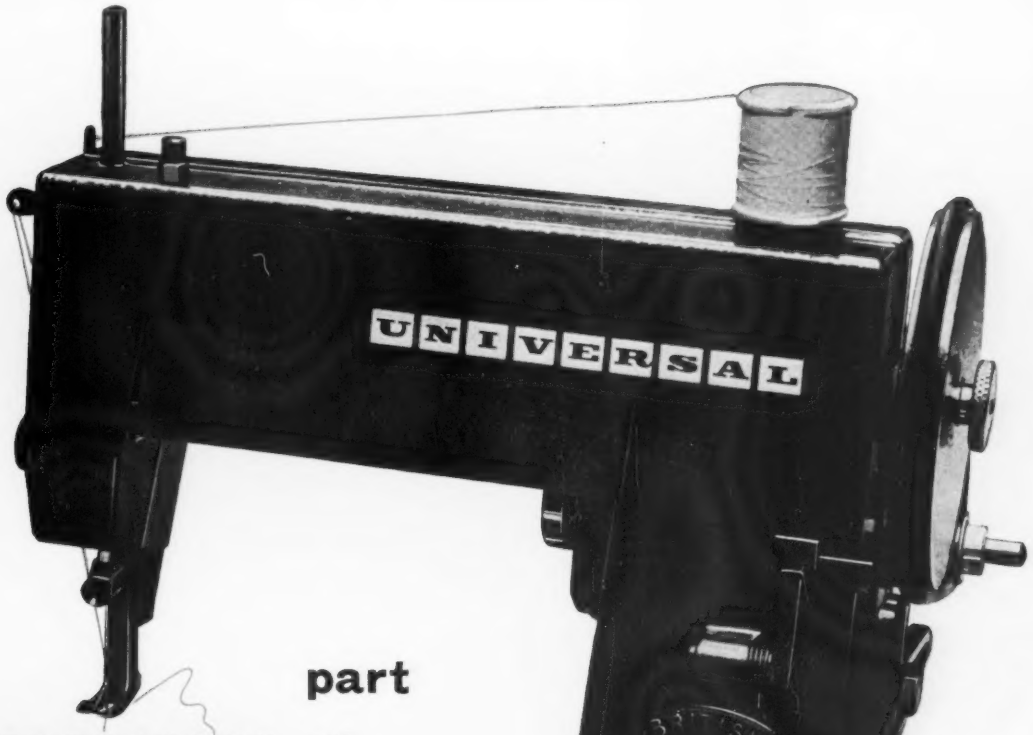
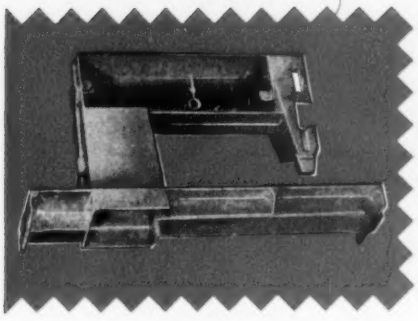


part of the pattern



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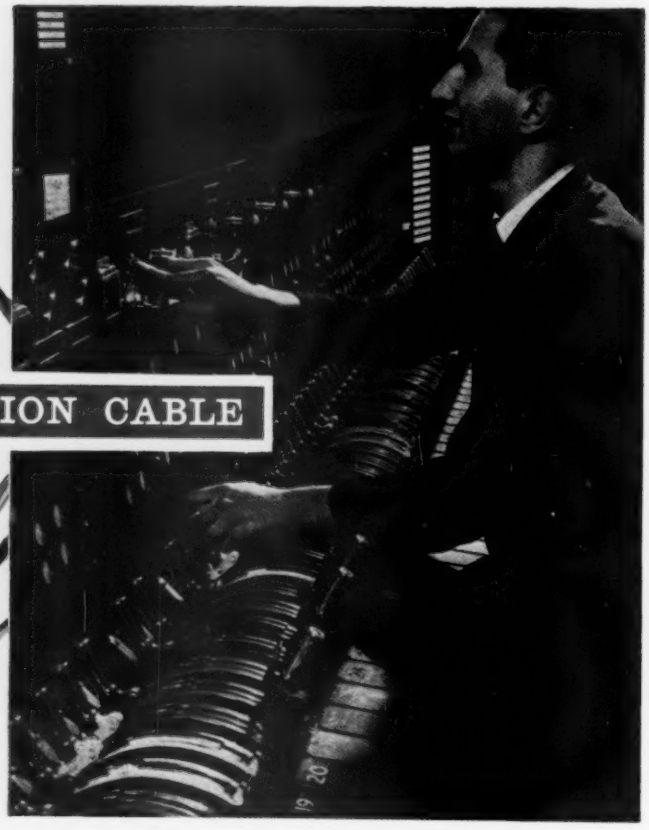

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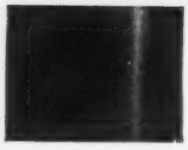

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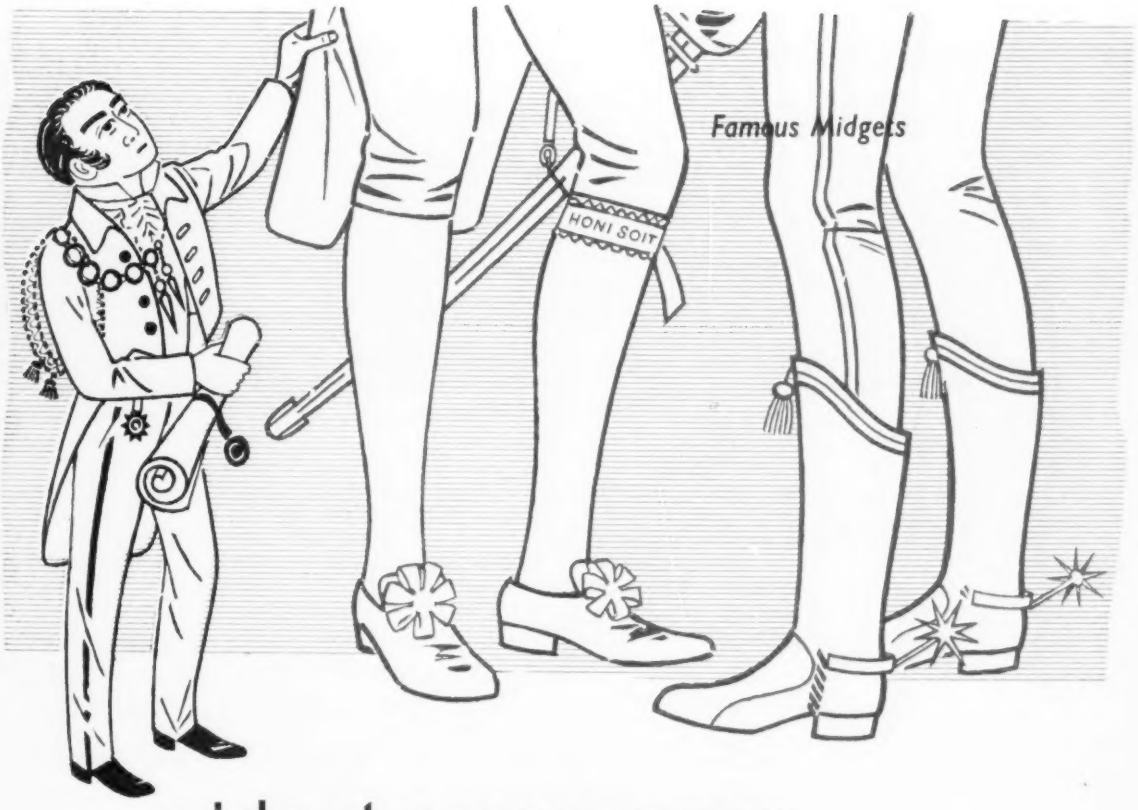

midget messenger

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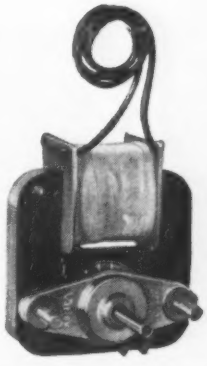

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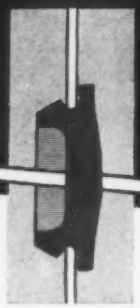

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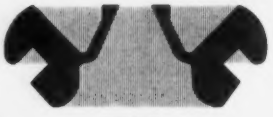

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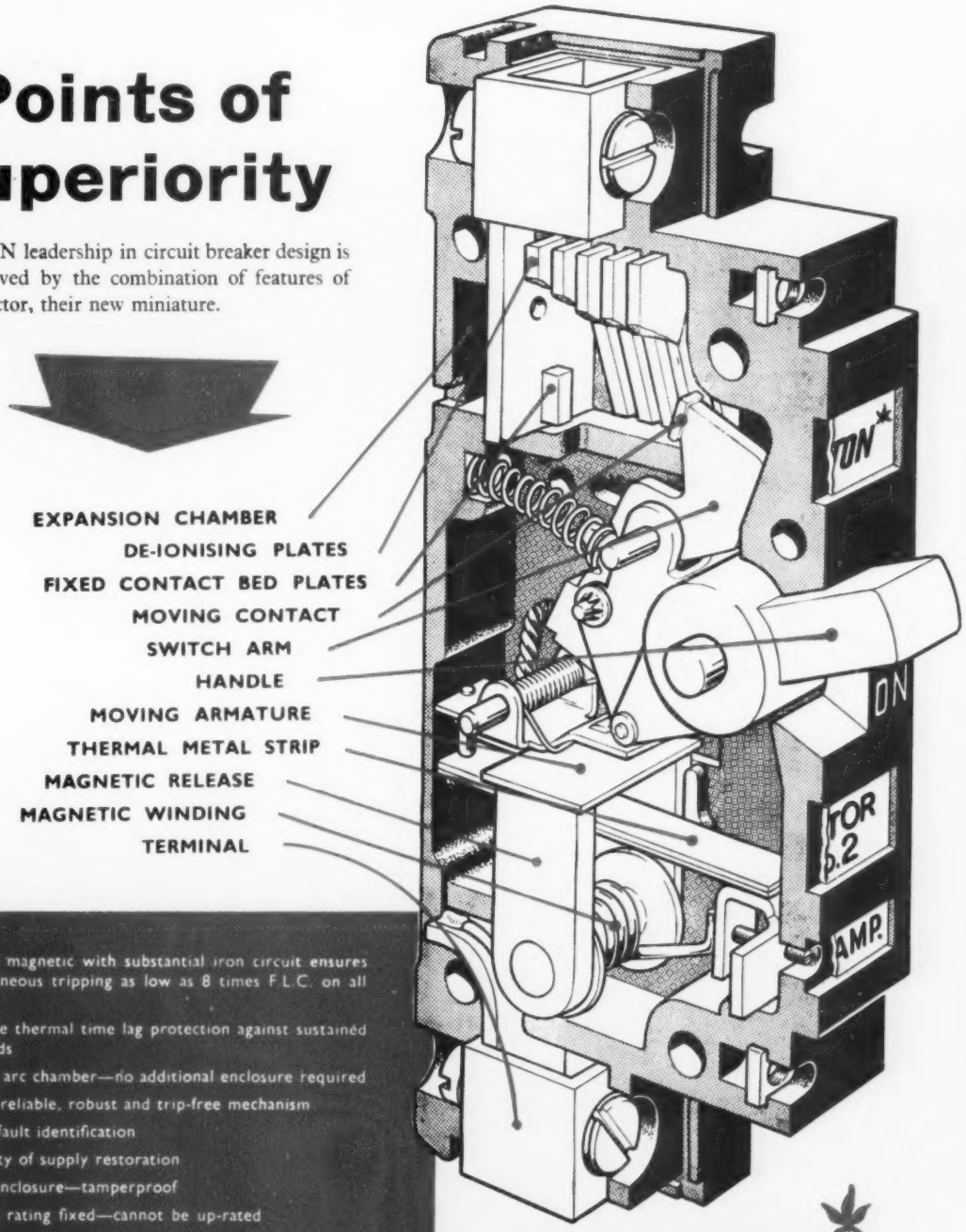

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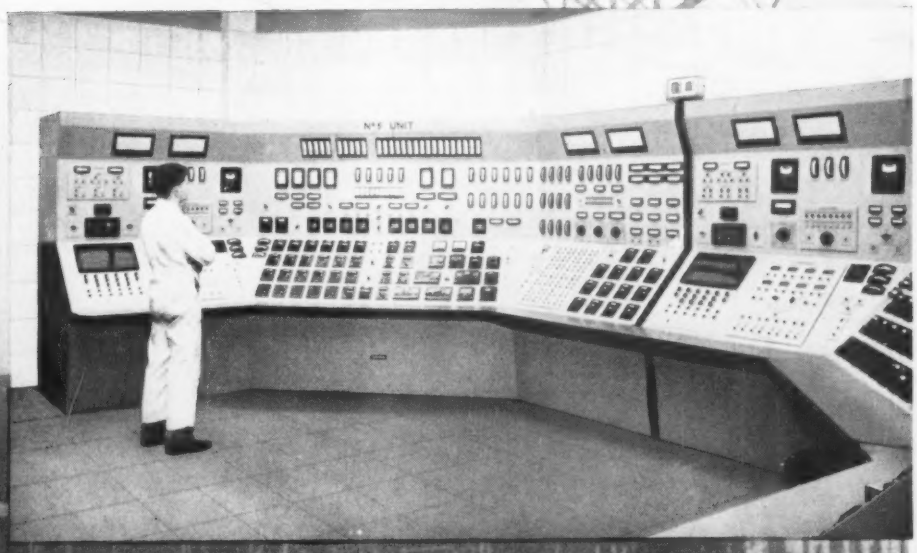

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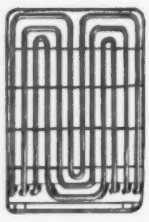
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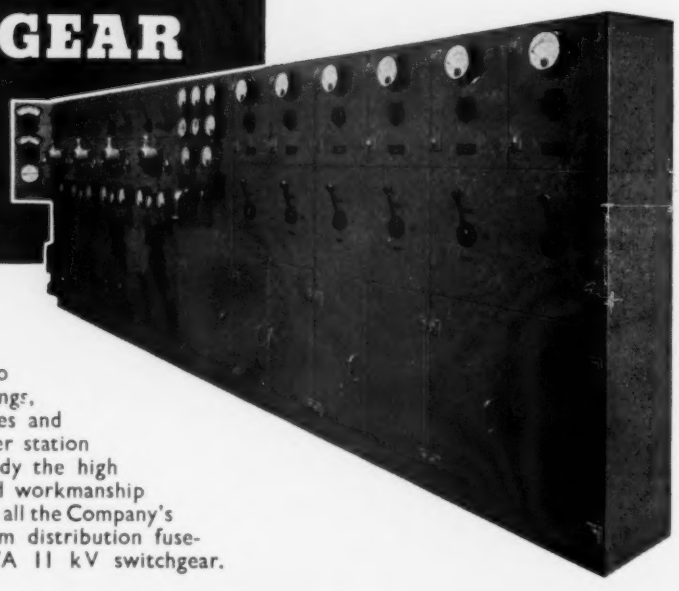

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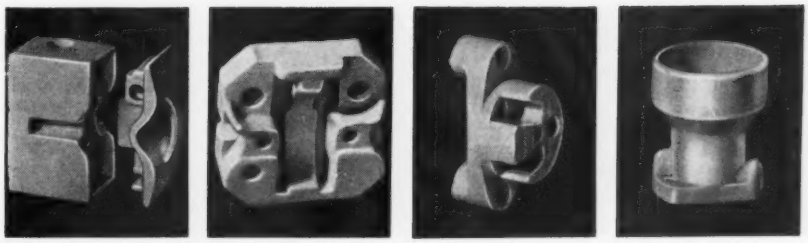
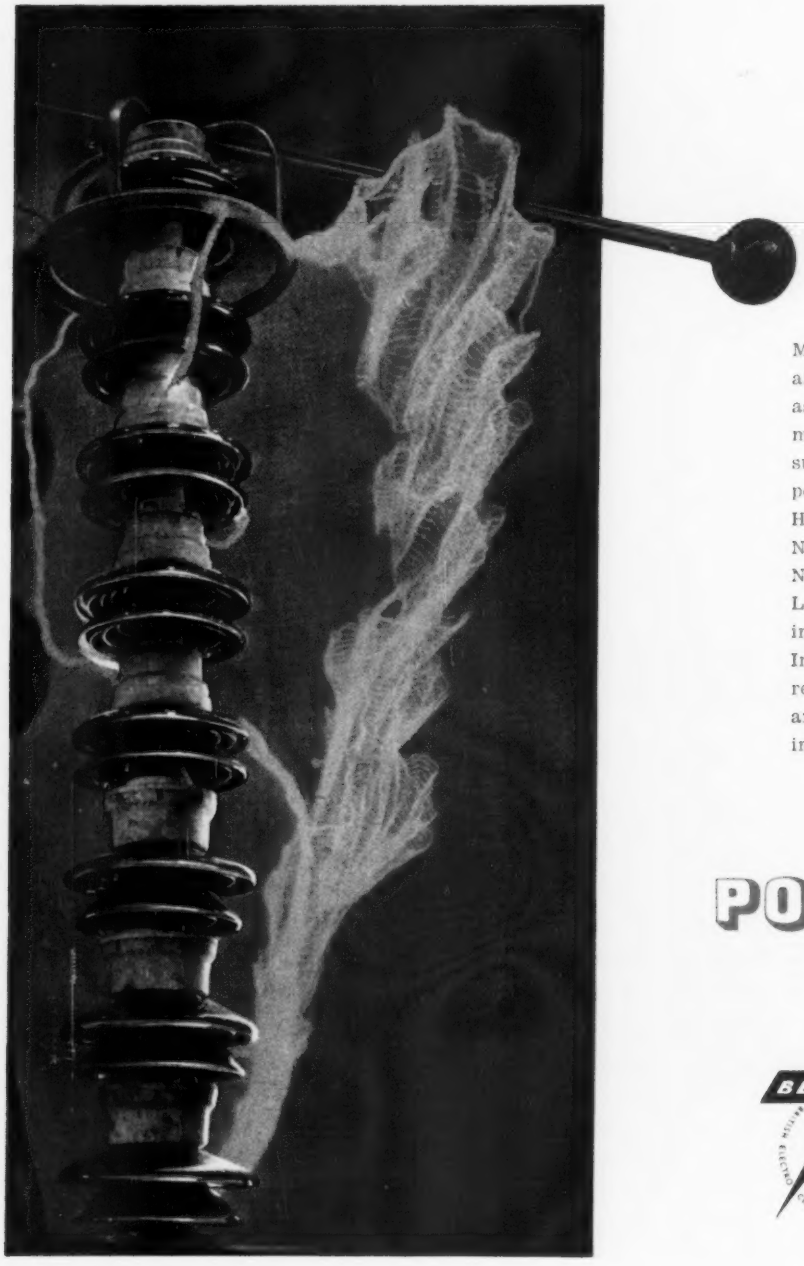


Larger than a man...smaller than a thimble!



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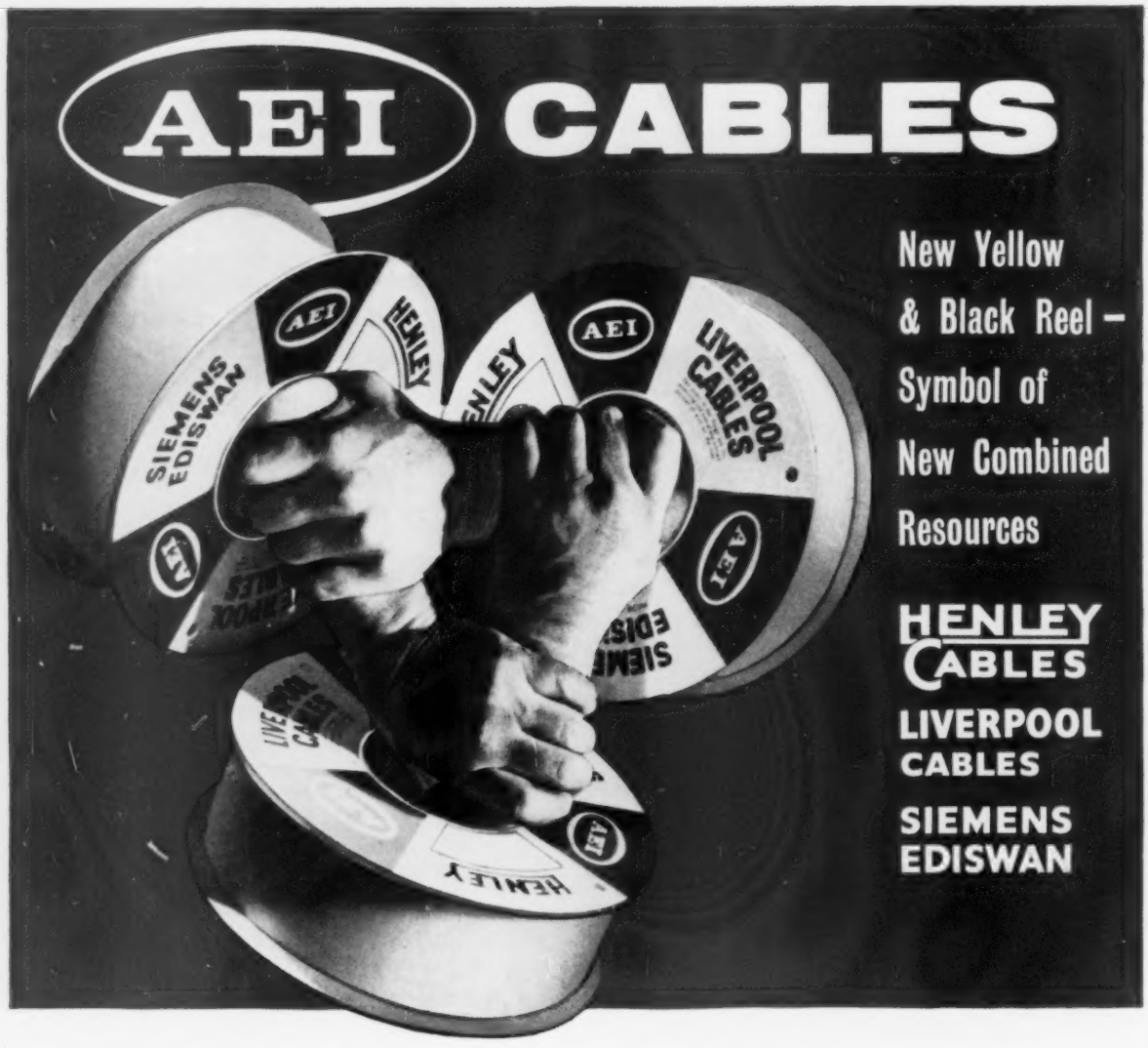

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THURSDAY 3 MARCH, 1960
Registered as a Newspaper Volume 137 No. 9

ELECTRICAL TIMES

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Dans ce numéro

Réapprovisionnement de réacteurs nucléaires ... 331
Les éléments combustibles d'uranium seront retirés ou introduits, à la station nucléaire de Berkeley, pendant que le réacteur est sous charge. Une machine automatique, convenablement blindée et pressurisée, qui remplacera en 75 minutes les 13 éléments combustibles dans chacun des 3.000 conduits, est actuellement en voie d'achèvement. Des machines auxiliaires, également blindées et pressurisées, approvisionnent les glissières d'accès au coeur du réacteur et les remplacements pour les barres de commande et d'absorption.

Systèmes de commutation semi-conducteurs ... 335
Des systèmes de commutation semi-conducteurs, à triple électrode au silicium, sont à une étape avancée de leur développement, d'une capacité de 50 ampères en sens conducteur et supportant un voltage en retour de 500 V. Les applications prévues couvrent de nombreuses opérations de commande, en conjonction avec des moteurs et autres machines électriques, ainsi que des dispositifs convertisseurs pour fournir du courant monophasé ou triphasé, de n'importe quelle fréquence désirée, à partir d'une source de courant continu.

Câbles au butyl pour distribution d'électricité ... 336
Des câbles à âme d'aluminium isolée au butyl, sont employés pour un système de distribution souterrain en Nouvelle-Galles du Sud, Australie, où le remplacement économique de lignes aériennes était requis. La température de travail plus élevée permise avec ce diélectrique fut l'une des raisons de sa préférence au chlorure de polyvinyl. Des moyens méchaniques sont employés pour joindre les conducteurs et une foreuse sous chaussée a été utilisée pour traverser les rues, avec des conduites en acier pour franchir les caveaux ou cavités du même genre.

In dieser Nummer

Brennstoffnachschub an einem Kernreaktor ... 331
Im Atomkraftwerk Berkeley wird das Aus- und Eintragen der Uranbrennstoffelemente ohne Unterbrechung des Reaktorbetriebs erfolgen. Hierzu dient eine entsprechend abgeschirmte und mit Druckgas gefüllte automatisch wirkende Chargiermaschine, die in etwa 75 Minuten in jede der dreitausend Reaktorbohrungen dreizehn Brennstoffelemente einlegt. Diese Maschine steht vor der Fertigstellung. Hilfsmaschinen, die ebenfalls abgeschirmt und mit einer unter atmosphärischem Druck gehaltenen Gasfüllung versehen sind, sorgen, für die Bereithaltung der Einfallkänale sowie der Steuer- und Absorptionsstäbe im Reaktorkern.

Halbleiter-Schaltvorrichtungen 335
Silizium-Halbleiter-Schaltvorrichtungen mit drei Elektroden befinden sich zur Zeit in einem fortgeschrittenen Entwicklungsstadium. Sie sind für eine Zufuhrleistung von 50 A ausgelegt und imstande eine Rückspannung von 500 V auszuhalten. Voraussichtliche Anwendungsgebeite umfassen zahlreiche Steuerungs- und Kontrollvorgänge im Zusammenhang mit Elektromotoren und sonstigen elektrischen Maschinen sowie Umformern zur Lieferung einphasigen Wechelstroms bzw. Drehstroms beliebiger Periodenzahl von einer Gleichstromquelle aus.

Kunstgummiumhüllte Verteilungskabeln 336
Mit Butylgummi isolierte Kabeln mit Aluminiumseele finden bei einem in Neusüdwales, Australien unterirdisch angelegten Verteilungsnetz Verwendung, das als wirtschaftlich günstigen Ersatz für ein oberirdisch verlegtes Verteilungsnetz dienen soll. Massgebend für die Wahl dieses Dielektrikums war u.A. die Tatsache, dass Kunstgummi höhere Betriebstemperaturen zulässt als Kunstharz. Leiterverbindungen werden maschinell bewerkstelligt und Strassenüberquerungen mit Hilfe eines Bohrgeräts bewältigt, während an Mauer-und Kellerdurchgängen die Kabeln mittels Stahlrohr geschützt werden.

Electric Water Heaters for Hand-washing 329
by R. M. Lang, A.M.I.E.E.

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ELECTRICAL TIMES

ESTABLISHED 1891

THURSDAY, 3 MARCH, 1960

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Comment

CHARTERED BUT UNSPECIFIED

Sir Willis Jackson has made good use of the platform provided by the impressive annual dinner gathering of the Institution of Electrical Engineers by sketching tentatively a new approach to the engineer's aim of winning public esteem for his true professional status. His plan is for bringing the term "chartered engineer" into general circulation as a title that the public can understand—without worrying about electrical, mechanical, civil or chemical specialities, to name the four institutions for whom the title would be reserved initially. Sir Willis was careful to base his case not on any liking by engineers for self-glorification, but rather on the growing importance of the engineer in the social and political scheme of things; and on the consequent need for him to be able to exercise an influence in the counsels of the nation. He was careful, as well, to admit that the idea may not meet with universal acceptance: and re-reading the speech away from the post-prandial atmosphere of Grosvenor House, some possible objections can be discerned. To take one of these, it is difficult to envisage how the scheme for IEE members to be "seen publicly to be members of an integrated corporate body of chartered engineers" can be fully worked out in the absence of at least some formal supra-institution machinery to manage co-operation. Yet Sir Willis made it a cardinal point of his plan that there should be nothing in the nature of amalgamation between the institutions concerned, and no extra administrative structure. Another difficulty is that some engineers obviously of the highest ability may remain outside the titled band, so confusing the public; though if the proposal eases the way to some legislative sanction for use of the "chartered engineer" appellation that problem may disappear. Such difficulties are not necessarily a bar to a scheme which offers many worth-while advantages. What must be hoped for now is that opportunities will be found to let the members of the IEE, and of the other bodies affected, discuss the idea informally, under the guidance of those who know its full import, but in a wider setting than council chamber or committee room.

DOMESTIC EQUIPMENT SHOWS

Increased representation of imported electrical domestic equipment is a feature of the Ideal Home exhibition, first of the spring's major electrical shows. The survey on a later page shows how hard importers will be fighting to increase their already large share of this market, which has held up so strongly over the past year and more. The hopes of future business which the show catalogue signals is backed by the more down to earth statistics of the official Trade and Navigation

returns, which form the basis of our monthly import and export survey. There is more than mere price considerations behind this, though the prices at trade level are in some cases remarkably low; indeed, the industry needs to be strongly on the watch against any edging down of these prices to the level at which provisions for protection against dumping can be invoked. Beyond prices, there is the question of style and design for special purpose, to which we have so often drawn attention in our columns. Yet such thoughts on foreign equipment must give place to appreciation at the growing range of the British product, seen strongly not only in the Ideal Home display, but also in the trade-show surroundings of EDA's first sales conference exhibition. The trade around Leeds as well as the electricity board delegates to the conference will have the opportunity of unhurried inspection of appliances at this exhibition, in so many ways a successor to the BEPC show now discontinued.

NEW STEP FOR CONTROL

Almost before the potentialities of the transductor have been fully assimilated into control engineering, a new device has appeared on the horizon which seems to offer a new breakthrough in control technique. It has always seemed probable that semiconductors would eventually offer new facilities in heavy current engineering; the more recent rectifiers have shown the range of powers that can be handled in limited space, and the transistor has demonstrated the possibilities of third electrode control. With the introduction of the silicon *p-n-p-n* triode this combination will have been achieved, to give a high speed, low-loss switching device controlled by currents in the microamp range but able to handle currents over a million times as great. Although not yet available commercially, it is unlikely to be more than a few months before limited quantities become available. Already sufficient triodes are available from pilot plants to enable experimental studies of various applications to be completed. These reveal not only the inherent simplicity of the device and its excellent characteristics, but demonstrate the wide variety of uses to which it can be put in control and current inversion. Here is the making of a minor revolution that will take control engineers more firmly than ever into the electronic field.

CONTROL ROOM BOREDOM

The electrical industry has had long experience of boredom in the control room. GEC have secured a fresh viewpoint by importing American consultants to advise them on the design of nuclear station control rooms from this aspect. Many of the recommendations the American team have made in fact fall into familiar categories of arranging instruments to facilitate quick detection of departure from normal, with provision of well-thought-out surroundings and task-designed seats, and careful placing of control buttons and levers to minimise confusion. But on the human side, there are some suggestions of wider interest. In particular, there is an argument that the control staff position in a nuclear station should be regarded as something to be held for a few years on the way to higher things; so that men of high intelligence may be attracted to a job which will involve long periods of routine work. This must necessarily be backed by an interlocking suggestion that control functions of the staff should vary from week to week: one week reactor room, another steam raising units; the third week turbine house, for example—all in aid of an alert mind if the unexpected emergency should ever arise in which man is a more effective decision-taker than automatic control. Further, because of the high improbability of such a circumstance, there needs to be provision of often-repeated training for control staff in how to deal with an emergency. So strongly do the US team feel on this, that they even envisage installation of a digital computer for use partly as a reactor simulator for emergency training purposes, despite the high cost involved.

MORE HELP FOR COMPETITIVE HEATING

Announcement over the weekend that the Coal Utilisation Council are to sponsor hire-purchase for coal-fired central heating schemes is a new challenge to the electricity industry: it is only a few weeks ago that the oil companies announced similar arrangements. It is not always realised that such a hire purchase arrangement, made with a finance house, is, in fact, readily available as a packaged deal for any type of central heating system, whatever the fuel, subject to technical approval by appropriate engineers. What is new about the initiative, first of the oil companies and now of the coal industry, is the willingness of the fuel supplier to sponsor the scheme and bring it to the attention of householders considering installations in the central heating category. It will be unwise for electricity to stay any longer outside this arrangement. Although no major change in actual financial arrangements may be needed—background warming with electricity can be achieved without the installation inconvenience that accompanies other fuels, and appliances themselves are readily available on h.p.—the switch to aggressive sponsoring of such hire purchase deals by electrical contractors and retailers and by the electricity boards is an urgent need to counter the publicity that the new move by the coal industry will receive. Already electricity holds one key advantage in relation to central heating. As the survey of the subject we reviewed last week showed, convenience in use and absence of trouble in running is a principal motive in the choice of central heating for houses; and electricity can offer that to a degree unchallenged by any other fuel.

Meteor

This week's quick summary of electrical news faces advertisement page 24.

Electric water heaters for hand-washing

by R. M. Lang,* A.M.I.E.E

NO one will deny that electricity provides an efficient and convienient means of heating water for hand-washing. Opinions are divided, however, on the most economic means of providing this service.

In the ELECTRICAL TIMES of 6 February, 1958, Mr J. Crisp gave some details of an investigation carried out by the Building Research Station, with the co-operation of the Ministry of Works, into the use of spray taps for hand-washing in offices. The conclusions were that on the grounds of hygiene and economy of water and fuel, this arrangement is highly desirable.

The South Western Electricity Board decided to carry out comparative tests between instantaneous type water heaters with spray nozzles, and a conventional storage water heater feeding the existing taps over the basins. On completion of these tests, it was suggested that the use of an "express" type of heater should be tried, suitably modified with a spray head, and the thermostat set down to a comfortable temperature.

Three Heaters

The three heaters which were tested at Electricity House, Bristol, under normal usage conditions, were:

(a) a conventional 12-gallon cistern-type water heater serving two hand-basins,

(b) 3 kW and 4 kW instantaneous-type water heaters with spray head serving one basin each,

(c) a modified nominal 1½-gallon self-contained non-pressure type 3kW "express" heater with a spray attachment on the swivel spout serving two basins.

The conventional 12-gallon storage heater and the instantaneous heaters are undoubtedly too familiar to warrant further description.

The "express" heater was a standard model but fitted with:

(a) a dispenser with spring-loaded spray fitting,

(b) ¾ in. angle valve with restrictor to govern the rate of flow.

(c) a 7 in. thermostat with a range of 90°F to 130°F.

Set up for Tests

The heaters were installed, as described above; the normal hot water supply to the basins having been made inoperative. Water and kWh meters were connected to measure the consumption of each heater. The tap operations were recorded by means of flow indicators and operational graphers. The meters were read weekly, and the water inlet temperatures and ambient air temperatures were checked from time to time.

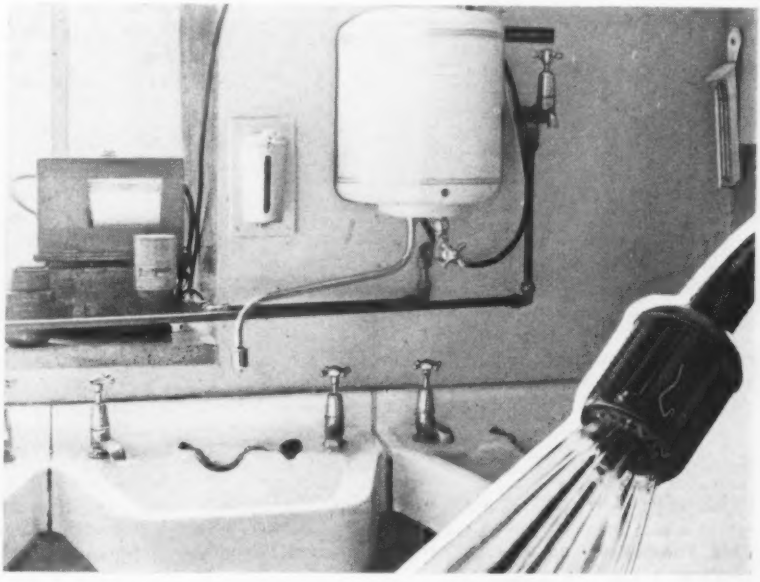
Rate of Flow and Outlet Temperature

The rate and temperature of flow from the conventional heater through the hot taps were of the normal value and call for no comment.

The maximum water pressure available (45 lb/sq in.) gave a rate of flow through the instantaneous water heater of 3·3 pints per minute for the 4 kW heater and 2·85 pints for the 3 kW model. The resulting temperature of 128°F was found by many users to be too hot for comfort. No doubt suitable design alterations could be made to overcome this point of difficulty. With both heaters, a minimum pressure of 15 lb/sq in. was necessary to operate the diaphragm switch.

The restrictor valve and the thermostat of the "express" heater were first adjusted to give what was thought to be a reasonable combination of flow and temperature. They were measured and found to be 2·48 pints per minute and 118°F, respectively. These values were maintained for the period of the test. As a matter of interest, the "express" heater gave a continuous flow of water at this temperature, which means that it was capable of providing an indefinite number of warm washes in quick succession.

* Mr Lang is with the South Western Electricity Board.



Figs. 1 and 2. Set-up for tests with "express" heater and basins (operational grapher on left). Inset, the spray is shown in action. It is of satisfactory nature for hand-washing although only a local head of water is available

Table 1. Electricity and Water Consumption

Week No.	Water Consumption	Electricity Consumption	No. of Tap Operations	Pints/ Wash	kWh Wash
	pints	kWh			
(a) *Conventional Storage Heater*					
1	839	32	288	2·91	0·111
2	854	35	301	2·84	0·116
3	927	36	305	3·04	0·118
4	851	34	305	2·79	0·111
5	861	35	305	2·82	0·115
Whole Period	4,332	172	1,504	2·88	0·114
(b) *Instantaneous Heaters*					
1	170	8·1	311	0·55	0·026
2	342	11·1	330	1·04	0·034
3	319	10·4	326	0·98	0·032
4	255	6·9	248	1·03	0·028
5	226	5·3	188	1·20	0·028
Whole Period	1,312	41·8	1,403	0·96	0·030
(c) *"Express" Heater*					
1	251	5·0	294	0·85	0·017
2	202	4·7	185	1·09	0·025
3	200	3·4	216	0·925	0·016
4	201	4·0	179	1·12	0·022
Whole Period	854	17·1	874	0·996	0·02

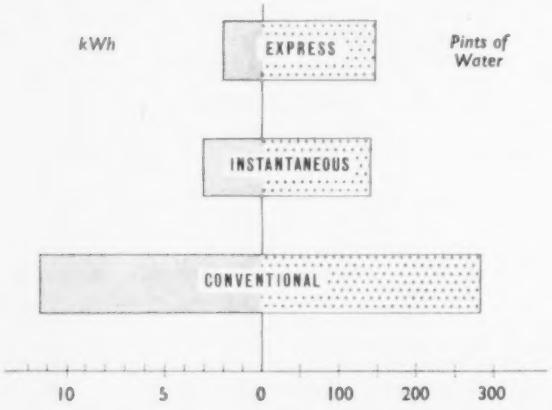


Fig. 3. Comparative consumption per 100 washes

Table 2. Overall Comparison

HEATER	CONSUMPTION PER WASH	
	Electricity (kWh)	Water (pints)
Conventional 12-gallon ...	0·114	2·88
3 kW Instantaneous ...	0·030	0·96
"Express"	0·02	0·996

Results of the Tests

The full results of the tests are given in Table 1. Each week comprised five working days and a Saturday and Sunday. The results for the two instantaneous heaters are given together, as their performances were very similar. In comparing the results obtained from (b) and (c), due regard should be paid to the difference of 10°F in outlet temperatures. Table 2 gives a summarised comparison of results. Results are reproduced graphically in Fig. 3.

Subjective Reports

About 26 male staff regularly use the hand-basins over which the heaters were sited, and they were asked to give their frank opinions of the "express" method of hand washing:

Four thought that the water was too hot
None thought that the water was too cold
Eight thought that the water was just right
One thought that the flow was too fast
Three thought that the flow was too slow
Eight thought that the flow was just right.

Other comments indicated that the method was "just right" and "jolly good."

What are the Real Costs

The running costs are self-evident, but the point should be made that the standing losses of the "express" heater were low, due to the low water-storage temperature. The weekly standing losses were as follows:

(1) Conventional 12-gallon 19·8 kWh/week
(2) Instantaneous ... ... Nil
(3) "Express" ... ... 1·3 kWh/week

From a capital cost point of view, the "express" also shows a saving. Its list price is lower than that of either of the instantaneous heaters; the plumbing cost is the same, so whether each heater feeds either one or two basins, the "express" proves the cheaper method. In the case of the conventional heater, there is an additional charge for the basin fittings and pipework, and the capital cost per basin is well in excess of either of the other two methods.

It is concluded that the "express" heater, modified as described, is eminently suitable for providing hot water for hand-washing purposes. It also has further advantages both in capital cost and water and electricity economy.

New E.R.A. Projects

NEW work started by the Electrical Research Association during 1959 is listed in the current issue of *Co-operative Electrical Research*, the Association's journal. Amongst projects selected for their special interest is an investigation to determine the extent to which cables undergo deterioration when operated for short periods under overload, as in an emergency. Another power system topic newly receiving attention is the extent to which irregular fluctuations of voltage in supply systems is acceptable in terms of the effect on electric lighting. Fluctuations caused by arc furnaces are being studied first, since these contain components at frequencies at which the eye is most sensitive. Later the effects of colliery winders, steel-rolling mills and other fluctuating loads will be studied.

Following work on thermal storage in the concrete paths of glass-houses, the experiments have been extended to cover other storage media, using eight new 12 ft by 8 ft glasshouses at the Association's Shinfield station. Also, preparations are being made to determine the effect of wind pressures on tall structures.

In the more fundamental field, the Association had begun working on materials having very high permittivities, but which are not ferro-electric. There have also been important developments as regards the behaviour of microscopic bubbles of gas released in dielectric liquids under the action of a strong electric field. Finally may be noted the development of a prototype machine for automatic testing of large numbers of small resistors. The machine can deal with 1,200 resistors at a time.

Refuelling Berkeley

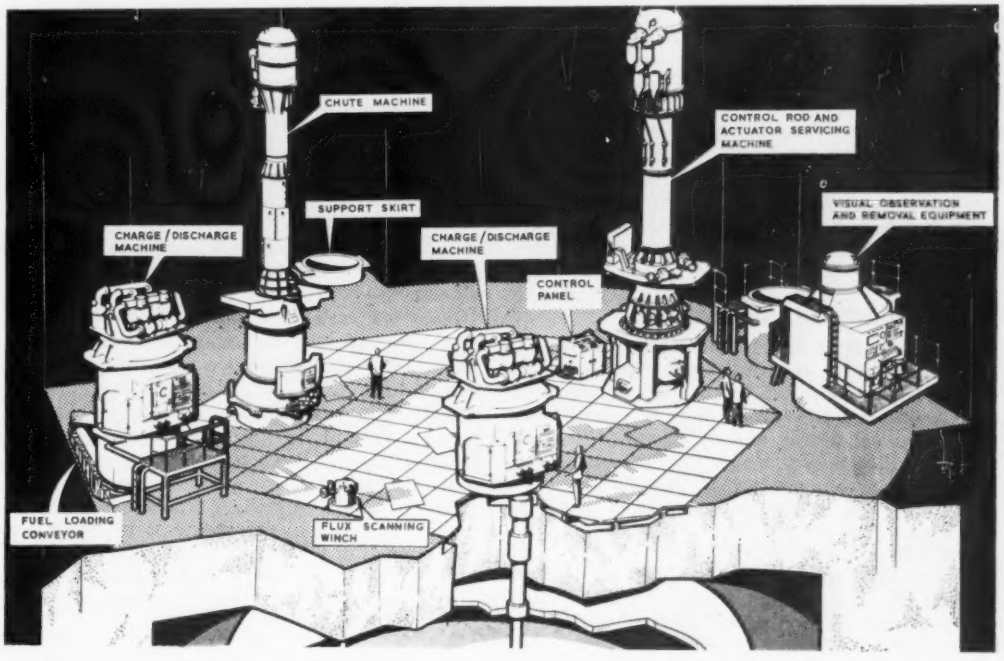
NUCLEAR FUEL HANDLING MACHINERY

BERKELEY nuclear power station will be one of the first in the world designed specifically for electricity generation and in which refuelling must be possible without shutting down the reactor. The nuclear fuel elements will rest in 3,000 vertical channels in the reactor core, to which access will be possible only through 60 standpipes extending from the reactor charging floor above the core-pressure vessel to between 20 and 40 ft above the reactor core itself. Fuel-handling machines must be designed with adequate radiation shielding and to resist the reactor cooling gas pressure. The main items of charging equipment will consist of a charge/discharge machine, a chute machine and a control-rod changing machine. Recently we were privileged to see some of these machines, which involve precision machining and unusual design features in their construction, at the John Thompson Ordnance factory.

Refuelling the reactor involves lowering a chute in one of the standpipes through which the fuel elements can be withdrawn from a group of channels, positioning a discharge machine over this chute, removal of the spent fuel, positioning of a charging machine, refuelling, and finally removal of the chute and resealing the standpipe.

The fuelling chute is housed in a chute machine in one of three magazines. The remaining two magazines accommodate flux-scanning and fixed absorber chutes. The chute machine is placed over the appropriate standpipe by a crane and a gas seal completed between the two. A remotely controlled grab in the machine removes the standpipe shielding plug and lowers the chute from one of the three internal magazines. With the chute in position, the chute machine can be removed and replaced by the discharge machine. A gearbox in the base of the discharge machine engages with the chute already in position, enabling it to be moved to a particular fuel channel. Incidentally, positioning accuracy is to within 0·22 in. Fuel elements are then drawn up, one by one, from the core through the chute and into a magazine in the discharge machine. A grab locates each fuel element, engages with its cap and hoists it into the magazine which has one compartment for each element and for the fuel channel plug. The machine has duplicated heat exchangers to ensure that the irradiated fuel cannot overheat in the magazine. The entire sequence is controlled automatically by a punched card system and is designed to be completed within 75 minutes. When a channel has been completely discharged, the machine is sealed, purged, and moved by crane to a discharge point for subsequent removal of the elements. Refuelling is accomplished by an identical machine loaded with unused fuel elements.

Probably the most complicated machine is used for servicing control rods and their associated winches. It enables control rods, winches and absorbers to be exchanged with those stored in the machine. This machine stands about 48 ft high, is 10½ ft in diameter and weighs about 150 tons, and all its operations are controlled from a separate trolley. Control rods are located by a manipulating tool, using periscopes.



Reactor charging floor. A charge/discharge machine is shown on the left and another in position over a central reactor standpipe. The two tall machines are, on the left, the chute magazine and on the right the control rod servicing machine. On the extreme right is a visual observation machine incorporating television camera for internal examination of the reactor

The chartered engineer

I.E.E. PRESIDENT CALLS FOR INSTITUTIONS TO CO-OPERATE

THEME of Sir Willis Jackson's speech at last Thursday's annual dinner of the IEE was the need to establish in the public eye the image of the "chartered engineer," without close regard for his speciality. Sir Willis was replying, as president, to the toast of The Institution. He introduced his case by remarking on the rapidly increasing extent to which chartered engineers were coming to occupy the highest managerial and administrative posts in industry and commerce and in public and government service. These positions made demands for much more than "mere scientific and technical competence."

A second factor was the increasing speed and directness of impact of the achievements of chartered engineers on the life of the community; Sir Willis thought that the problems raised had to be taken account of by chartered engineers. Third in his list of considerations came the emergence of the chartered engineer not only as guardian and guarantor of the national economy, but also as the primary agent in a new international diplomacy in which more than an expanding export trade was at stake.

For these reasons, chartered engineers could no longer be content to be merely the creators and controllers of new forms of engineering equipment in all their technical complexity. The very impact of their creative effort was involving them directly in the complexity of human and social problems. Yet did the general public see the engineering profession in the light of such a summary of its achievements and responsibilities? Sir Willis doubted it at times; though chartered engineers were entitled to attach importance to the point only in so far as it adversely affected the scale and quality of recruitment to the profession, and the opportunities of engineers to give the service they could to the community, by affecting the reception accorded to advice offered by engineers.

If chartered engineers sometimes felt anxieties on such points, they should consider whether the reason, and thus the solution, did not lie within themselves; whether it did not arise in substantial measure from the difficulty, if not the inability, of the general public in understanding the difference between many categories of men who carried the description of "engineer"; and indeed, of "professional engineer."

Inter-institution Collaboration

Sir Willis suggested that in recent years there had been an important step forward through establishment of closer and closer collaboration between the Institutions of Civil, Mechanical and Electrical Engineers, and between those institutions collectively and other bodies. This collaboration had taken the form of a number of joint committees of the three institutions, and in the establishment by these institutions with others, of the British Nuclear Energy Conference and the British Conference on Automation and Computation.

In Sir Willis' opinion, there could be no doubt that such exercises in collaboration between existing bodies had restrained the creation of still further specialist organisations. He thought it of the greatest importance that collaboration of that kind should be strengthened and extended as rapidly as possible. Yet even if this occurred, as he hoped and believed it would, he doubted if by itself it would be adequate for the main task he had in mind.

From this point, Sir Willis went on to "hazard the view that we shall bring great benefit to the engineering profession as a whole, and contribute greatly to the growth of an appreciation of it in the public mind more in keeping with its importance with its national service and potentialities, if we can devise a means of bringing the members of the primary constituent branches of the profession together under the common title which I have used several times this evening—that of the chartered engineer."

He did not mean amalgamation, he said, because he thought it essential not to restrain, or even appear to restrain, the vitality and initiative of the constituent branches of chartered engineering. Nor did he wish to see the creation of some superimposed administrative machinery. What he hoped for was some minimal device which would ensure that chartered civil, mechanical, chemical and electrical engineers in the first instance, would be seen publicly to be members of an integrated corporate body of chartered engineers. It would not be easy to do this, and there might be many who would not agree with the objective.

Electrical Engineers and Physics

The toast of The Institution had been proposed by Sir George Thomson, the physicist, who is currently president of the Institute of Physics, and who was recently elected IEE Faraday medallist for 1960. He dealt lightly with his subject, talking first of the help the electrical engineer had given the physicist.

Speaking of the part electrical engineering played in space exploration, Sir George remarked that the unexpected discovery of a new belt of radiation was an answer to those who asked what was the good of spending a lot of money on such projects. If a man could say what he expected to find from a research project, that was probably a good reason for refusing him the money to carry it out, for which he asked.

He went on to remark on the closer ties developing between the Institution and the medical profession, and made special mention of the possible use of an ultrasonic device as an alternative to X-rays, for examining the body without damaging delicate tissues in the way X-rays could.

Just under 1,500 members of the Institution and their guests sat down to dinner at the Grosvenor House, Park Lane. After the speeches (reported), the immediate past president, Mr S. E. Goodall, dealt expeditiously and humorously with the toast of the guests (they included the Lord Chancellor and other ministers, high commissioners, and many distinguished representatives of public and professional life). The reply was made by the Mayor of Westminster.

Readers Views

Correspondents writing under pseudonyms are asked to submit their names and addresses in confidence to the Editor

Aluminium Coal Chutes

I WAS interested in the article "Aluminium Reduces Blockages in Coal Chutes" in your issue of 11 February. I have found that many engineers are incredulous when they hear about aluminium providing better resistance to wear and abrasion than steel.

The reason, which you did not give in your article, is simply that in a steel chute, there is a film of rust on the surface of the plate, this film is comparatively soft, and is wiped away by the moving coal, exposing a clean surface which immediately takes on a new rust film. The process is continuous, and the result is the same as rapid abrasion. Softer aluminium plate lasts much longer because the oxide film on aluminium is hard, tough, very adherent, and self-healing.

Aluminium bodies for tip trucks carrying coal, ash, gravel, sand and similar materials have given phenomenally long lives as compared with steel bodies, for the same reason.

F. G. McDonald, M.I.E.E.,
ALCAN (U.K.) LTD., LONDON W.1.

Adaptor Dangers

TO Mr R. St.C. Ison's letter of 11 February, I would like to add another example of the danger of adaptors bringing the ring circuit into disrepute. I have just become aware that an adaptor is on sale to convert the 13 amp socket-outlet to 5 amp 2 pin. In its favour I must say that it is fused and marked "Shaver Adaptor." This outlet is, of course, reversible, but already I have seen it in use for a radio with its s.p. switch. It is also a fact that a great many 13 amp sockets have no switch control. Other uses (or misuses) will come to mind and no doubt into use.

E. C. Dunham,
BRIDPORT, DORSET.

Service Cut-out

I SHOULD like to add my support to a plea by one of your correspondents, recently, suggesting that it is time a larger cut-out than the standard 60 ampere is considered by area boards for ordinary domestic premises.

With the growing demand for electrical gadgets in these, we hope, advancing stages of progress, it is quite obvious that the 15 kW maximum demand for domestic premises is going to be exceeded in many more cases than already is the situation. In these circumstances, the usual procedure for supply authorities, at present, is to install a three-phase (60 amp per phase) service. It is useless installing a three-phase supply and asking for the load to be balanced because Electricity Supply Regulation 28 will preclude the use of this procedure.

I do not consider the additional cost of a three-phase supply in domestic and even in many other premises is warranted, in any case. It involves extra metering, extra switchgear, extra risks at medium voltage, without any real advantage. The question of final load balance on the system networks being an arbitrary resultant, not particularly affected by the regular use of three-phase services.

E. Simons, A.M.I.E.E.,
NEASDEN, N.W.2.

Burglar and Fire Alarms

IN these days of "smash and grab," high fire damage, and shortage of suitable applicants for night patrol duties, enlightened management is turning more and more to automatic intruder and fire detectors. Unfortunately, there is a good deal of confused thinking, mainly through lack of knowledge, over what can be done, and I, a constant reader of your excellent journal, was most disappointed to see no less than two examples of this in the issue dated 18 February.

For example, under the above heading (p. 268), the statement is made that "burglar and fire alarms in themselves are all very well, but . . . they cannot . . . cover such tasks as checking for the window left open or the motor left running." This is just not true. One of the simplest methods of intruder alarm is to fit accessible windows with electrical or electro-magnetic contacts (there is a wide choice) wired in series on a "closed circuit." In this way it is impossible to set the alarm whilst any window on the circuit is open, and an immediate check is possible, not only of the fact that a window is open but in which zone it exists. Remote indication of an individual motor left running can be obtained with a vibration detector secured to the frame or bedplate. Alternatively, a machine shop could be covered by using a sensitive microphone, and there is even a serious suggestion that, where the risk justifies the cost, closed circuit television should be considered. Where patrol men are employed it is usual to have some form of watchman's clocking system and there are elaborate variations, incorporating two-way telephone systems and "progress indication." In fact, the writer has one or two installations that have given every satisfaction over a period of years. The "Syncurity" system is an elegant way of doing this and no criticism of it, as such, is implied or intended by this letter.

I would like to say a word, however, about the 999 system. Most people are familiar with it, but it is not generally appreciated that calls do not ring directly into a police station, and that a number of incidental problems arise. There is an increasing body of opinion in favour of the alarm ringing first in a manned post, a caretaker's flat, or in a central station, several of which are operated by one or two of the alarm companies.

My second observation concerns the light beam fire alarm (p. 267) and the statement that it is an unusual method of detecting an outbreak of fire. Here again, my criticism is not of the device, but the fact that there is a suggestion that it is unusual. Several smoke-detection

photo-electric devices have been available for some years.

In conclusion, may I say that, whilst I have had many years' experience as a user of alarm apparatus, I am not and never have been connected with any alarm company or manufacturer of alarm apparatus.

L. R. Leworthy,
SUTTON, SURREY.

* * *

MR LEWORTHY makes observations on systems which are obviously well known to him. As manufacturers of watchman's systems such as he describes for a considerable number of years, we also are only too well-aware of what can be done, from the intruder's as well as the manufacturers' point of view.

The article referred to says devices cannot check on windows being left open or motors being left running. This is obviously true. There is an important difference between the type of indication put up by intruder alarms, which can be tackled by an experienced crook and the patrol man checking visually. Mr Leworthy's statement that burglar alarms can cover such tasks such as checking for the window left open by fitting contacts to accessible windows is, of course, true, but a patrolling watchman has under his supervision not only accessible windows but windows which are normally deemed inaccessible. We agree that remote indication of a motor left running can be obtained by various means, and that such systems will amply cover particular risks; but does this, in fact, come under the scope of a burglar alarm system, or does it introduce a third or fourth system of detection, thus leading to further complications? We consider that Syncurity is ideal in as much as it may be necessary for a motor to be left running intentionally on say two nights during the week, and it may be necessary in certain circumstances for bunsen burners or a water supply to be left in operation, and it is essential that the watchman does patrol the areas where these processes are going on in order to determine whether anything untoward has occurred.

It would, indeed, be a most complicated system of burglar and fire alarm which would cover all these eventualities.

It may not be fully appreciated by Mr Leworthy that Syncurity not only incorporates a two-way intercom system and progress indication, but provides facilities for the alarm to be set up from any patrol point whether the watchman is early, late of visiting out of sequence.

Syncurity is designed to protect watchmen as well as premises, and it is presupposed that the premises to be protected, do by virtue of particular circumstances, demand a watchman rather than "devices." The watchman has the facility to call for assistance from other watchmen through the medium of the controller. The controller has the facility to locate any watchman, anywhere on his patrol and instruct him as conditions dictate. We would assure Mr Leworthy that it is not for the purpose of "elegance" that Syncurity keeps a minute-by-minute check on the watchmen it protects or, in turn, the property which they patrol.

With reference to the 999 call system, we feel that we must point out that the Syncurity system does, in fact, set the alarm ringing first in a manned post (where else better than the control room?). The automatic 999 call operates only if the supervisor fails to stop the call going out after a predetermined period. Mr Leworthy's comments on the operation of the 999 system might be considered alarmist in nature.

In conclusion, we would say that we cannot agree that people are as ignorant or confused as seems to be suggested. In our experience, at least, there is a widespread understanding of security in industry. Security officers have been very helpful to us in the past in offering their opinions and co-operating in development work.

D. F. Burgess,
THE SYNCHRONOME CO.,
ALPERTON, MIDDX.

H.P. for the Young

THE letter from Mr L. R. H. Fordham on H.P. was a welcome reminder of the true position. The chance of proving an H.P. agreement against a minor is most remote, but we find that the guarantor (in the shape of a near relative) usually honours the agreement. The economic position today is that the juniors have so much money that it is a temptation to enter into these agreements and I would say there are very few backsliders among the teenagers. In cases of doubt the rental of goods instead of H.P. is the best way out.

"Peregrin."

Small Contractors' Viewpoint

I FEEL the remark by *Megohm* under the heading "Heating of Cables," ELECTRICAL TIMES, 11 February, cannot go unanswered by a small contractor. The remark I refer to is "I doubt if the small contractor or the radio type contractor will take much notice of such matters. They are more concerned with just getting the points to work, getting out and getting paid." In view of the fact that I have always considered articles by *Megohm* sound knowledge gained by experience, I am surprised to find such a statement in his article.

Having worked for large firms and Government departments, and being now in business on my own, it is my experience, whether large firm or small firm, we are all interested in getting out and getting paid. Whether it is the small firm that is guilty of just getting the point to work and not the large firm is doubtful. I remember working for a large firm on a large installation where an electrician, drawing full rate of pay, asked me to show him how to use the common 500 volt "Wee Megger." This will go to show how much of the larger installations may be connected up without even being introduced to an insulation test. This type of work is often carried out with the assistance of local labour, to keep down lodging and travelling expenses, even if the local labour is not all it should be.

Megohm must realise the number of small contractors who start their own business because they have often been forced to do work by large firms in a manner they would not do for themselves. I would go as far as to say that some large firms get away with poor class work a small contractor would not get away with, merely because they are large firms. There may be some justification for suspicion where one man professes to be "Radio, Television, Appliance and Installation Engineer," as this covers a lot of ground for one man. I fail to see, however, how a firm can be assessed by whether it is large or small, providing they know what jobs to take on with the plant available.

G. T. Griffin,
HARROGATE, YORKS.

Semiconductors for power

New Prospect for Heavy Current Control

Westinghouse three terminal Trinistor controls 25 A from 50 mA signal

ONE of the latest devices to come from semiconductor research is the three-terminal *p-n-p-n* type unit which offers outstanding advantages as a high-speed switching device in the power field. Such a bald statement, however, fails to indicate the wide variety of uses and applications to which such a semiconductor device can be put. Intensive studies are being made in several laboratories and, with the close approach of the commercial production stage, a firm step is being taken towards the introduction of semiconductor techniques into power control engineering.

When a silicon *p-n-p-n* switch, which may be regarded as a combination of *p-n-p* and *n-p-n* transistors, is subjected to a high forward voltage, it reaches a breakdown condition in which the forward voltage drop falls suddenly to a value similar to that of a silicon diode, in consequence a heavy current can pass, hence the concept of the device as a switch. In its practical application, this breakdown condition is more conveniently obtained by applying a small current through the final *p-n* junction. To this end, a third or "gate" terminal is connected to the second *p* layer and the application of as little as 2 V, 50 mA at a polarity positive with respect to the cathode is sufficient to cause a breakdown, or the "switch-on" condition.

The advantage of this device over the ordinary transistor is primarily its ability to handle heavy currents. There is no bending over of the current curve at high values such as occurs with the transistor, and the construction is one that lends itself to cheaper production than with heavy current transistors.

50 mA controls 25 A

Recently we had an opportunity of seeing some of the work of the Westinghouse Brake and Signal Company and the illustration in the heading shows one of their *p-n-p-n* switches to which the name "Trinistor" has been given. This has a mean half-wave current rating of 25 amps and a forward blocking voltage of up to 400 volts. It is such values, combined with the very low power required in the control circuit, that open up so many applications in the power control field.

Apart from the absence of moving parts, the outstanding advantage of this device is its high speed of switching, a matter of only 2 microseconds when switching on. Once the breakdown condition has been established, however, the gate control is no longer effective and the current will continue to flow until either a substantial reverse voltage is applied or the current falls below a certain limiting value termed the sustaining current. The time taken to return to the blocking condition in either of these events is approximately 20 microseconds. Thus the Trinistor has certain similarities to the gasfilled thermionic tube, but it has the advantage of low voltage drop of about 1·4 volts at 50 amps peak in the conducting condition as well as its small size, robustness, absence of heater, and fast switching action. It has a long life and will withstand temperatures up to 100°C. Normally it is mounted on a robust cooling fin.

Application to Control

When used on a.c., with a current zero every half cycle to restore the blocking condition, the Trinistor offers a simple method of control by determining the point on the half wave at which the current is switched on. This technique can be applied to a bridge circuit with two arms containing Trinistors, the other two having ordinary silicon diodes, or a three-phase bridge can be used. Such a circuit was seen at the Westinghouse Radlett laboratories controlling the speed of a d.c. motor by means of a small potentiometer acting on the gate circuit, a method which gives quick and sensitive response.

One of the obvious applications of such a device is that of a d.c. to a.c. inverter. In such a case, there is no natural zero current pause to interrupt the sustaining current, it therefore becomes necessary to apply a reverse voltage to restore the blocking condition. This is simply done by charging a capacitor and then on a signal from the gate circuit, discharging it so as to provide the reverse voltage and a collapse of the sustaining current. One application of this principle that was under test, was an inverter fed from a 24 volt battery supplying at 1,000 c/s a bank of fluorescent lamps.

These are but two of the practical applications that are under study by the Westinghouse company at Radlett. These laboratories are specially devoted to a study of basic circuits for use with silicon triodes which at present are being produced in a pilot plant elsewhere. It is hoped that limited quantities will be available shortly for experimental study by prospective users.

The low losses of the Trinistor enable it to be used as a fast a.c. contactor as the simplest of the applications but the low current required by the gate circuit facilitates the building of more complex oscillators and controllers to perform a wide variety of heavy current operations even to dynamic braking and a.c. frequency conversion. Certainly this *p-n-p-n* semiconductor device opens up a new far-reaching horizon for electrical control engineering and may well have as great an effect in power control as the transistor has already had in light current engineering.

Butyl-rubber for underground l.v. distribution

by N. E. McDonald*

CENTRAL West County Council with headquarters at Parkes, a town of 9,000 population and 230 miles west of Sydney, is at present installing underground cables to replace the overhead reticulation in the business section of Parkes.

The scheme generally provides for single-core aluminium conductors having butyl-rubber insulation and protected with a neoprene sheath. The neutral conductor is bare copper. The street lighting conductors and the service cables are copper with p.v.c. insulation. All cables are laid direct in sand about 24 in. below the footpath, and protected with a concrete tile over the full length. The service cables are taken from the trench in flexible tube under or through floors of consumers' premises, but, where exposed (above floor) steel conduit is used for improved appearance and to facilitate painting.

Kerbside pillars have been installed at each street intersection. These are equipped with h.r.c. fuses and street lighting control is installed where necessary.

Joints

Straight-through joints and service tee-off joints are effected with aluminium crimp fittings attached by means of a hand-operated hydraulic compressor which exerts a pressure of 12 tons/sq. in. Before commencing the compression joint the cable and fittings were given a liberal application of electrical joint compound (EJC) which ensures low resistance joints by chemically removing the oxide film from the aluminium affecting the base metal. On completion of the mechanical joint the whole is insulated by taping. "Scotch" fill and "Scotch" tapes were used for this purpose.

About 3,000 yards of trench have been opened up. The pavement is all concrete and therefore, reinstatement will be rather costly.

Distribution Scheme

From the substation two 0·5 sq in. feeders have been run to the principal pillars—one on either side of the main street. From these pillars 0·3 sq in. conductors have been run in both directions along the main street with 0·12 sq in. conductors in the side streets. The neutral conductors are 0·15 sq in. copper in the main street and 0·06 sq in. copper in the side streets. The m.e.n. system of earthing applies to the whole Municipality.

The minimum size service cables and the street lighting conductors are 0·0225 sq in. (7/·064) copper. All services from the mains are four-wire—bare neutral—terminating in moulded service boxes.

Generally it has been found that one service can be used to supply two shops, in which case the appropriate two-, three- or four-wire extension is taken through the dividing wall to a service box in the adjoining premises.

* Chief Engineer, Central West County Council, New South Wales, Australia.

The existing overhead mains are unsightly. They were installed in 1924 and all poles are due for replacement. Therefore, this conversion job is being undertaken at the most economical time. The project of laying underground cables in the shopping area of Parkes is regarded as the commencement of a general scheme of undergrounding throughout the Municipality, spread over several years. The business people are enthusiastic about it in spite of the noise and mess on the footpaths from time to time.

Installation

On the practical side it might be mentioned that the work was divided into sections which could be handled comfortably within a week. All road crossings were effected by means of a "Mole" under-road drill which avoided interference with the bitumen surface or interruption to the normal traffic flow. Holes up to 8½ in. diameter have been drilled with this machine. In negotiating hotel cellars and the like which encroach on the footpath area, steel piping has been used as ducts for the cable.

The use of steel ducts and the under-road drilling prevented the complete bed of sand as intended for the cables. This was the principal reason for the use of butyl-rubber insulation which has a higher temperature range as compared with p.v.c. The comparison is approximately 85°C to 60°C. Another advantage of butyl-rubber —not adopted here—is that it may be vulcanised to ensure completely waterproof joints. The aluminium conductor cables were supplied by Enfield Cables Pty. Ltd., Sydney. Conductor details are given in Table 1.

Table 1. Details of cable construction

Size	Nom. Area Sq in.	Rating Amp.	Thickness Butyl-Rubber in.	Thickness Neoprene Sheath in.
61/·103	0·5	121	0·121	0·094
37/·103	0·3	320	0·102	0·078
37/·072	0·12	200	0·080	0·063

The distribution pillars and the moulded service boxes were imported from England and supplied by Henley's, Sydney. This firm also undertook the sweating of the aluminium conductors into the copper terminals of the pillars. Aluminium crimp fittings were supplied by Dulmison Pty. Ltd., Sydney. This firm, as agents for Minnesota Mining and Manufacturing Co., also supplied the "Scotch" tapes.

The cost of the job is estimated at £25,000, including installation of consumers' mains to existing switchboards (which is done without cost to the consumers) and removal of the existing overhead mains.

AROUND THE TRADE

BY PEREGRIN

MARCH—and the march of the seasons begins all over again: birds begin to build their nests; we poor males are hounded from pillar to post by the spring cleaning; and the young man's fancy lightly turns to thoughts of marriage, reduction of income tax, and furnishing on the never-never. All of which should mean lots of business for many of us, if the shadow of the Budget did not loom so large. However, the Chancellor of the Exchequer has warned us not to expect big tax cuts, so we can go ahead and promise reluctant customers a refund of any reduction on the items which would otherwise hang fire. We stand to lose either way and a sale in hand now is surer than the doubtful promise of two after the Budget.

Spin Dryer Problems

And talking of sales; so far this year I have noticed a decided falling off in the number of spin dryers sold, although with the kind of weather we have at this time of the year we expect good business. Only spin dryer sales have faltered; tumbler, cabinet and rack types have soared and the sales of the cheap Flatley have been phenomenal. One cannot just record such facts and probe no further, so I have been making inquiries to trace the cause. The answers I received were astonishing and they practically all boiled down to the suggestion that spin dryers discolour the clothes or, alternatively, that white clothes dried in a spin dryer lose some of their whiteness. I understand that manufacturers strongly contest this statement, and have carried out tests to support their argument that nothing of this kind in fact occurs; that the clothes remain as white as when dried by any other means.

But there it is. An idea that is far too widespread for my peace of mind, or for any manufacturer's sales scheme. Of course, I can attempt to correct my own customers, but it is hard going for a mere male to try to convince a not so mere female.

Talking it over with my "kitchen controller" I have come to the conclusion that the real source of the trouble is that the new "whiter than white" detergents demand a very high water temperature: so many immersion heaters are set at only about 160°F that clothes washed in this temperature with the new detergents are not bleached properly. (I know I am in danger here of conceding a point to a certain wash boiler manufacturer!) If whites are hung out in the sunshine for any length of time this fault is corrected; but clothes which have been spin-dried need very little time in the sunshine, if any. The other possible source of trouble is rinsing in the spin dryer. I cannot see how clothes can be properly rinsed in this way—and badly-rinsed clothes soon lose their brightness. It looks as though a little brighter than bright publicity is needed here.

E.C.A. Dinner

The Electrical Contractors' Association held another very successful annual dinner on 9 February. It was a refreshing evening; the speeches were of a high order, direct, and to the point.

Mr W. H. McFadzean, chairman of the BICC, stated in his toast to the ECA that the cable industry had not had a good year in 1959. I am not surprised! Nor overimpressed with the various excuses—over-production, Monopolies Act, etc. I doubt whether a wild cat scramble for any market ever pays. I made my comments in my February notes. I liked the remark, made by Mr V. J. Stock, the president of the ECA, that retailers give their customers a technical service and, quite rightly, criticise the quantity terms given to their competitors for small quantity orders. And Mr C. R. King, chairman of the Electricity Council, an old champion of the electrical contractors, who said they were the best unpaid representatives of the supply industry. I hope some of the rising generation of engineers were impressed by the remarks he made during his speech on this and some other points.

Refrigerator Market

I read that Dagenham Council have decided to go ahead with their scheme for the rental of refrigerators to council house tenants and that another council is considering spin dryers for their flat dwellers. Doubtless other councils will follow suit. On the face of it these schemes suggest a fairy godmother waving a magic wand to give housewives all the convenience of modern appliances on a very-easy-terms hire-purchase scheme, without cost to anyone. Of course, the cost of running the scheme may be charged with the interest on capital expenditure to the housing accounts as a whole, but however it is dealt with someone, who is not qualifying for a refrigerator or spin dryer may well be subsidising a council house tenant who is. Looking further into the economics of the scheme it is obvious that the electrical retailer is to be penalised in two ways. In addition to his loss in possible sales (the rating of shops is on a much higher scale than domestic dwellings) he may pay heavily through the rising demand for local rates to finance a scheme which is so much against his interests.

To carry the idea of the fairy godmother to a quite logical conclusion, I can see no reason why council tenants should not be supplied with furniture as well as refrigerators, so that they may live in the complete comfort that their status as council house tenant warrants; or garden tools so that they may cultivate the gardens with which they have been blessed by a benevolent council. It is a fundamental principle that governmental benevolence and demand should fall fairly and squarely, equally on the shoulders of all, but this appears to be benevolence to one and demand to another. Furthermore, I am doubtful whether it is right to teach that section of the public which resides so smugly under the shelter of the council wings that it is a wise policy to mortgage income for 10 years. Is it all wise economy and where is it going to end? It obviously will not stop there. Mr J. Woodward, the Wolverhampton councillor, has already shown us the red light when, on the television programme Panorama of 22 February, he talked of the retail trading activities into which he would like to push his council.

Comfort and relaxation for the housewife is the keynote of an all-electric home. The wall unit is the Revo "Contemporary" fire

DOMESTIC ELECTRICAL APPLIANCES TO BE SEEN AT THE E.D.A AND IDEAL HOME EXHIBITIONS

Electricity in the home

BY fortuitous chance, both the Ideal Home and EDA Conference exhibitions coincide this year. True, the Ideal Home exhibition is from 1-26 March at Olympia, London, and is open to the public, while the EDA exhibition is from 8-11 March at Harrogate and is confined to technical and trade personnel, but, so far as electrical equipment is concerned, the emphasis in each event is on domestic appliances. In fact, a manufacturer who is represented at both places is, in most cases, showing identical products.

The EDA exhibition is, of course, the first to be organised in connection with the annual conference and it will, to a large extent, fill the gap left by the demise of the BEPC exhibition. The presence of a large contingent of commercial officers and personnel from the supply boards at the conference is justification for the wide display of domestic appliances with lesser emphasis on wiring, power generation and distribution. At Olympia, where electricity in the home is a familiar theme, probably the most noticeable aspect of this year's display is the greater number of electrical appliances of continental manufacture which are on show. Both refrigerators and washing machines are featured among the newcomers to Britain from overseas sources during the past 12 months, a recognition of the untapped potential market for these appliances in which home manufacturers are now facing keen competition.

In this, of necessity, brief survey of the household electrical appliances to be seen at the two shows, the number of both EDA and Ideal Home stands will be given in brackets after the exhibitor's name. The Ideal Home stand numbers—and in many cases the one exhibitor has two, three or four stands in different sections of the exhibition—are in italics; the EDA stand number is in normal roman figures.

Refrigerators

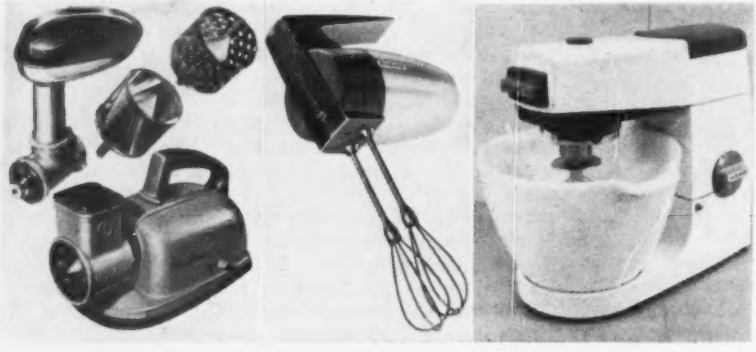
Domestic refrigerators are to be found on the greatest number of stands, more than 20 manufacturers being represented. The largest is, without question, the fabulous "Foodarama" by KELVINATOR (26, *47*) with a capacity of 12 cu ft storage space and an additional 6 cu ft of deep freeze. Strictly for the wealthy home, this refrigerator costs over £440 with purchase tax and is the senior in this company's range of seven models including a home freezer.

AEI HOTPOINT (39, *61, 82, 260, 346*) are showing their newly styled "Iced Diamonds," the E.37 and E.50; ENGLISH ELECTRIC (27, *35, 264*) displays four models, the smallest with a capacity of 2·6 cu ft and only 32 in. high; PRESSED STEEL (22, *48*) has a junior home deep freezing cabinet among its five units on show; the GENERAL ELECTRIC CO. (29, *43, 285*) presents 4, 6 and 8 cu ft models; while FRIGIDAIRE (40) will be showing 3, 4 and 8 cu ft refrigerators at the EDA exhibition.

All of the above are compressor types and absorption types are represented by ELECTROLUX (34, *67, 292*) with their full range of four models with capacities from 2·6 to 7·6 cu ft, and MORPHY-RICHARDS (23), whose "Astral" refrigerator will be on show at Harrogate.

During the past year British newcomers in this field have been the TRICITY (25, 77) with its neat styling, castor mounting with brake and, of course, a compressor model; and SIMPLEX ELECTRIC (30, *68, 334*) with two new "Creda" refrigerators, the "300" and "475." Another British manufacturer who has included a domestic home freezer in its range is LEC REFRIGERATION (53, *55*). This is the C.F.25 with a storage capacity of 5·4 cu ft and counter-balanced top-opening lid and it joins the three domestic models "Coronet," "International" and "Continental" which have proved so popular.

Among the new refrigerators from Continental manufacturers are compressor models from Siemens, distributed here by LONOR LTD. (*497*), the recently introduced "GENERAL" (*418*) range and other makes distributed here by H. J. BALDWIN AND CO. LTD. (51), INDES REFRIGERATORS LTD. (*413*) and AEG WELMAC CORP. LTD. (*325*). The latter company includes in its range an unusual model, the Frigomat, which incorporates a deep freeze compartment accessible through the drop-down top, or lid, of the refrigerator. Access to the daily storage shelves is by the normal front door and either compartment can be opened without disturbing the contents or conditions in the other; moreover, the temperature in the deep freeze, 42



Left to right. The "Moulinex" mincer and grater combination at £9 or, with fruit squeezer attachments, £12 12s; the handy Philips "Whiskette" at £3 18s 9d and the new Kenwood "Chef" at £27 6s

degrees of frost, is maintained regardless of the setting of the thermostat in the refrigerator section.

Yet another continental innovation which is sure of wide appeal is the "Polaris" wall refrigerator on the HAMPDEN stand (*412A*) at Olympia. The 39½ in. long unit, 31 in. high, can be suspended on a wall from which it projects 17 in. and it has a capacity of 4·8 cu ft. The balanced, upward opening door is magnetically latched when closed and the sealed compressor unit is at the top. The price is 85 gn.

At the Harrogate exhibition on the GEC stand (29) a photo display of the first prototype thermo-electric commercial refrigerator, working on the Peltier effect, will be seen. The thermocouples used in this device are of semi-conductor type and, with a power consumption of only 0·25 watt per couple, a 20-30° C drop can be obtained.

Summarising the general display and range of refrigerators offered, they represent a good cross section of this highly thriving industry which can now offer the housewife a choice from more than 120 different sizes and models of compressor types and over 20 absorption types. Although there is a great deal of similarity between the various designs —and the compressor units are, in many cases, from the same source— much of the individual appeal is in refinements of detail and colour. Some makers are using automatic defrosting as a special point of sale, but since most of the incoming continental models are now making this standard, it should not be long before it is a standard feature here as well. One of the major problems with imported appliances, that of servicing, has been dealt with satisfactorily by the appointment of the EMI servicing organisation, Home Maintenance Ltd., to deal with all such matters, but the reliability of the modern electric refrigerator with its sealed unit is so high that faults and complaints are rare even after many years of use.

Home laundry appliances

Washing machines, spin dryers, tumble dryers and drying cabinets occupy almost as much display space as refrigerators at both exhibitions. Recent surveys show that the market for these appliances is only slightly less than for refrigerators, but the equipment has not, as yet, fallen into the same uniformity of pattern. Washing actions include vertical and horizontal cylinder machines with or without paddle agitation, oscillatory or rotary motion, all with their staunch adherents ready to show how their system is better than others. Variation in spin dryer design seems to centre more on the extent to which the drum is perforated to allow the water to be dispersed by centrifugal force. Unperforated drums, of varying shape and with top or bottom outlets, feature in the combination rinsing and spin drying appliances and these will, in due course, almost certainly become standard practice.

For the lighter fabrics and so-called "man-made-fibres" which do not need ironing, tumble dryers are available and, in the lower price bracket, drying cabinets. Combination washing and spin drying machines are now being produced in increasing numbers and are on the way to supplanting the early types of washing machine with power driven wringer. No new British types of powered wringer/washing machines have appeared in recent months and only a few of the better designs, such as the AEI HOTPOINT "Countess," "Princess" and "Empress" (39, *61, 82, 260, 346*), are still in popular demand.

It is, perhaps, significant that the majority of the continental washing machines which have come onto the British market during the past year are of the combination type with, in the higher priced models, automatic control.

One of the latest to appear, the "Brunlec T5R," incorporates a reversing drum type washer container on the principle now accepted as standard practice in commercial laundries. This, too, is completely automatic and can be seen on the BRUNLEC stand at Olympia.

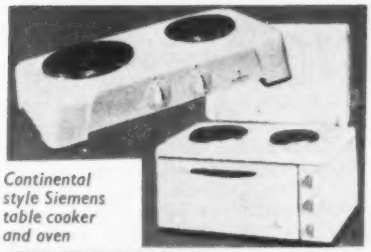
The two most recent British machines to be marketed are the "Twenty-one" by BURCO LTD. (47, *293*) and the "Liberator" by ENGLISH ELECTRIC (27, *35, 264*). Both of these have features which are well worth examining at the stands and, in particular, the special device for regulating water temperature and time in relation to the fabrics being washed in the "Liberator." In far too many cases fabrics have been damaged by the use of too high a washing temperature and the machine blamed for the result. Other British manufacturers who are displaying combined washing and spin drying machines include HOOVER LTD. (24, *252, 262, 281, 344*), ADA (HALIFAX) LTD. (*303*), BENDIX HOME APPLIANCES LTD. (45, *336*) and WILKINS AND MITCHELL (6), makers of the new "Servis Supertwin."

From continental manufacturers there are the AEG "Turnalux" on the AEG WELMAC stand (*325*) and the Siemens machine on the LONOR stand (*497*).

Electric Cookers

The tremendously increased interest in electric cooking which has resulted in a 40% rise in sales over the last year is reflected in the many new features on latest designs which have appeared during the past few months. Perhaps the most significant is the universal adoption of quick acting rings and plates on lower priced models with, in many cases, autotimers as well. Previously these have been, for the most part, exclusively for the luxury cookers. Even the low priced Jackson "Estate" cooker on the RADIATION stands (33, *69, 254*) is now provided with three hotplates and autotimer at £35.

Other new cooker features are the full width grill in the hotcupboard of the Tricity "Marquis" and "Viscount" models on the THORN ELECTRICAL INDUSTRIES stand (25, *77*), eye level grills on the Jackson "Highline" models, and GEC "Splendid" (29, *285, 43*) and the



Continental style Siemens table cooker and oven

The latest GEC cooker, the "Splendid" with eye level grill

The Jackson "Estate" cooker with autotimer

Top plate and grill chamber of the Tricity "Marquis"

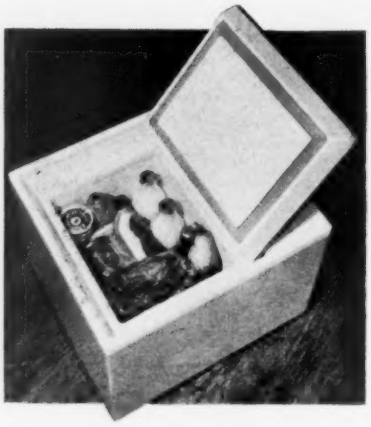
introduction of a four-plate version of last year's popular Creda "Mercury" on the SIMPLEX stand (30, *68, 334*). In almost every case the open wire heating element in the oven has been replaced by the sheathed wire type and, except for the occasional boiler-grill plate, on grill elements as well. One of the latest designs which will be seen for the first time is the GEC "Splendid," while lovers of spit roasted foods will find the latest Creda "Mercury" with a rotary grill in the oven of particular interest.

From continental and North American sources the Siemens table cookers, hotplates and electric ranges on the LONOR stand (*497*) are worthy of attention while, for the long purse and larger menage, MOFFAT and WESTINGHOUSE cookers on the Canadian stand at Olympia and the EDA stand at Harrogate must also be visited. In this respect, it must be mentioned that the trend in North America and certain parts of the continent towards kitchens with built-in ovens and table-top hotplates, typified on these stands, is reflected in the British market in the TRICITY range.

Another trend is towards the cooking of food in special appliances, with in-built heating elements and thermostat controlled, which are styled for use at the dining table. Several of these will be seen at both exhibitions of which the relatively new "Electric Skillet" on the MORPHY-RICHARDS stand (23) is quite representative.

Among the refrigerators to be seen are, left, the GEC "Fabulous Four," with, below, the Kelvinator "Foodarama," the Frigidaire "DZ.101" with the little home freezer on top and the Prestcold HF 51

The revolutionary prototype refrigerator using semi-conductor elements in a refrigeration cycle which has been developed by the GEC



Mixers and Mincers

In the preparation of food the all-electric home is at a great advantage in that the housewife can use one of the many motorised kitchen units which take the drudgery out of such operations as mixing, mincing, whisking and shredding. Until comparatively recent days these devices, complete with all of the accessories, were relatively expensive and, in fact, the best designed and styled mixers, such as the new KENWOOD "Chef" (12, *63, 253, 284*) are above the £25 mark even today. From continental sources, however, there are the "Braun" on the BERRY stand (44, *78, 282*) and also the Siemens foodmixer at £14 5s on the LONOR stand (*497*) and the MOULINEX models (*261*) to choose from while, for the even slenderer purse, there is the PHILIPS "Whiskette" and food mixer on stand *327* at Olympia. In line with the trend for built-in kitchen appliances there is the "Power-Maid" multi-purpose unit which even includes a knife sharpener in its range of attachments. This can be seen at Harrogate on the CANNON stand (43).

There is no end to the number of electrical gadgets which have been developed to help the housewife in the kitchen some of which, like the kettles and coffee percolators, are so beautifully styled and finished that they can be taken into the dining room and plugged into the power point there. Particularly at the Ideal Home exhibition, many hours can be spent without seeing all which is on view.

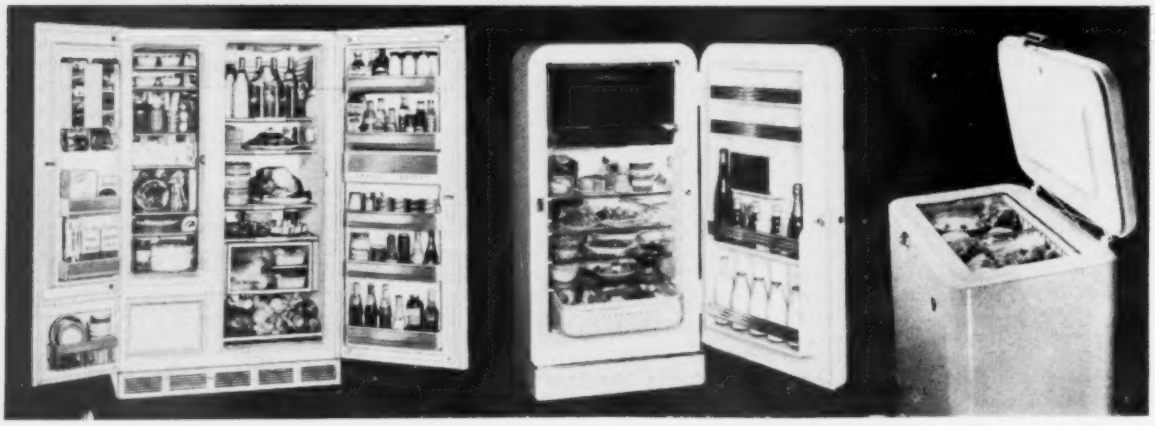
Cleaners

No home today is without electric light by choice and, where there is electricity for light, you may be sure of finding a vacuum cleaner as well. For many years now these appliances have been limited to two broad types of design, the "cylinder" and the "stick." In the latter class the "Hoover" probably still holds pride of place while "Electrolux" remains the greatest favourite in the cylinder group. Both of these companies have restyled and improved their models during the year and the latest marks can be seen on the HOOVER (24, *252, 262, 281, 344*) and ELECTROLUX (34, *67, 292*) stands. Apart from these basic types—and there are many alternative makes to choose from, all of which are highly efficient—new ideas in styling are to be seen on the PARNALL cleaner (33, *69, 254*) and in the continental models. It can truly be said today that there is a vacuum cleaner to suit every pocket.

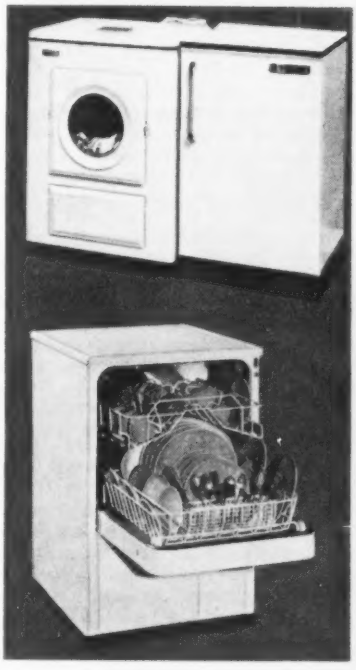
And, talking of cleaning, housewives with the larger families are finding the electric dishwashing machines a good investment at around the £100-£120 mark. Three which are worth examining are the KENWOOD "Dishmaster" (12, *63, 253, 284*), the BULPITT "Swanmaid" (46) and the "Colston" which can be seen on the Electrical Development Association stand at Olympia (*60*).

Electric Heating

The clean air campaign is not entirely responsible for the great increase in



Left to right, the English Electric "Liberator" washing machine with automatic temperature and timing control. The Philips spin dryer. The Frigidaire "A-1000" spin dryer. The Burco "Twenty-one" washing machine. Below, the Bendix washing machine and refrigerator. The Bulpitt "Swanmaid"



the use of electrical heating in the home. It has long since dawned on the housewife that the cheerful appearance of the coal fire is not sufficient compensation for the dirt, smoke and soot which is its inevitable accompaniment particularly in these days of poor quality, highly expensive coal. From the expense standpoint, the purists may argue the low overall thermal efficiency of conversion from coal to electricity, but they cannot explain to a householder's satisfaction why the cost of electricity has only increased by some 30% over the last ten years, while the price of coal has nearly trebled. By the time that the total fuel bill for coal, gas and electricity has been compared with the equivalent total bill for an all-electric home, whatever may have been the case in 1950, it does not apply to 1960.

Apart from this, the choice of convector, radiant, fan accelerated convection, black heat infra-red, or even the more recently advocated floor-warming installations enables electric heating to be applied to the requirements of any room either for continuous or intermittent use and the choice of appliances of each type is now such that even the most fastidious could not complain. A great deal of attention has been given to styling and one would indeed be hard to please if they could not find something to suit from the displays on the BELLING (47, *49*) BERRY (44, *78*, *282*) EKCO (7, *75*) DIMPLEX (9, *66*), EASIPOWER (48), HEATRAE (5) and several continental stands to mention but a few. For those who really like the look of a coal fire, there is the BERRY "Magicoal" range to be seen on stands 44 at Harrogate and *78* and *282* at the Ideal Home; for those who prefer radiators of the hot water pattern, a visit to DIMPLEX (9, *66*) is recommended while for those interested in floor-warming installations, the best place to call is the EDA stand (3, *60*). A few of the latest types of electric heating appliances are shown on the next page.

Automatic control of room temperature is also possible with all-electric heating systems and a number of thermostats for domestic use are available. Three of these are illustrated here and can be seen and handled on the ROBERT MCLAREN (4) stand at Harrogate and AEI SUNVIC (11) stand.

Electric Fans

The electric fan has also been brought up to date though, in many cases, it has been combined with an electric heater to provide cool air in the summer and warm air in the winter. Portability and modern design has reduced these appliances to the appearance of a pre-transistor radio set, but in some like the stylish MORPHY-RICHARDS (23) fan heater, functionalism in design has enhanced appearance without attempting to camouflage its purpose. At the other extreme the EASIPOWER (48) fan-heater could well be taken for a radio set.

During the past few months, a new name "Sofono" has appeared in the heater field. These are products of the GRANGE CAMELON IRON CO. (17) which, by sheer novelty of design, are bound to make their mark.

Water Heating

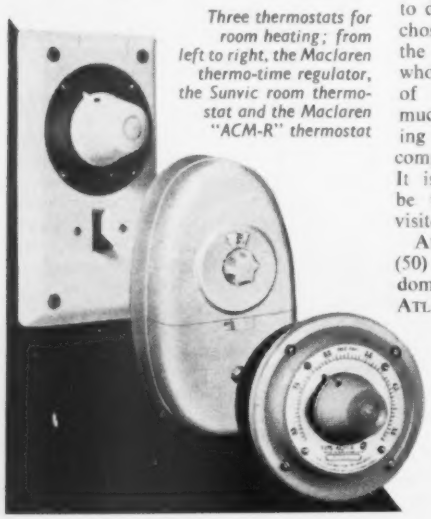
Electric water heating, either by immersion heater in existing hot water supplies as an adjunct to, or in place of, solid-fuel appliances is on the increase but self-contained lagged storage water heaters from 1½ to 20 gallons capacity are still in demand and, where new hot water systems are being installed, are to be preferred even though the cost is slightly higher. Names like SANTON (2), SADIA (8) and HEATRAE (5) are household words in this field, but they by no means are without competitors. For the small instant demand, two comparatively new heaters are now being ordered faster than they can be supplied, the Creda "Corvette," a SIMPLEX (30, *68*, *334*) product which will provide hot water for washing or boiling for tea making from a cupful to eight pints at will, in a matter of minutes and the ICG "Super-Clage" water heater which, though only 5 in. in diameter, gives instant hot water and is remarkably easy to install. This can be seen on stand *315A* at Olympia.

With so many electrical appliances at her disposal in the all-electric home, the modern housewife has only herself to blame if she is exhausted at any time between the instant when the electric tea-maker summons her at dawn with a hot cup of tea, to the moment when she tucks her toes between the sheets warmed by the electric blanket. But what of her husband? Is there nothing for him in these exhibitions? Is electricity for the housewife alone? By no means. For his leisure, or do-it-yourself activities, electric drills and their attachments have proved to be a boon and the latest of these, the REVO (*79*) sets a new standard in quietness and range of accessories while the long established BRIDGES "neonic" drill has extended its activities to grass cutting with a new attachment.

1. The M.E.M. "Rotovair" fan heater. 2. The Dimplex portable infra-red radiator. 3. The Easipower "Perfectaire" portable fan-heater. 4. The Morphy-Richards "Sheerline" convector. 5. The Morphy-Richards fan heater. 6. The M.E.M. wall "Memvek" convector

These are, however, minor interests among the many things, both electric and non-electric, which he will see at Olympia, but, to the housewife, not the least attraction of electricity in the home is the way in which it tempts the man to take a part in household chores which he would otherwise avoid like the plague.

So far as the Ideal Home exhibition is concerned, the model of the space ship will attract the male of all ages and it will, undoubtedly, be noticed that electrical and electronic techniques play a large part in the concept, for that is what it is at present. No concept, but reality, however, is the solar battery which can be seen on the SINGER stand (*273*) driving a sewing machine. Here is a significant achievement in harnessing solar energy in practical proportions which, though such devices will never supplant our power stations, are now coming within measurable distance of practical application providing only that there is a reasonable continuity of sunlight.



Three thermostats for room heating; from left to right, the Maclaren thermo-time regulator, the Sunvic room thermostat and the Maclaren "ACM-R" thermostat

Light and Lighting

Both at Olympia and Harrogate, light and lighting have their place in the exhibits. The GENERAL ELECTRIC CO.'s stand (*12*) is a carefully thought out display of colour and colour-rendering using papers and paints from the "Walpamur" range illuminated by tungsten filament and fluorescent lighting fittings to demonstrate how the lighting must be chosen and arranged to harmonise with the decor. What is less significant, but wholly important, is that a great part of the fine display at Olympia owes much of its grandeur to the skilful lighting effects in which all the leading companies in this field have co-operated. It is, perhaps, a pity that this should be taken for granted by the average visitor.

At Harrogate CROMPTON PARKINSON (50) are showing their new "Daintilite" domestic fluorescent lighting fittings and ATLAS LIGHTING (25) are showing their Chelsea fittings for tungsten filament lamps.

Motors and Cables

At the EDA exhibition HOOVER is showing the latest range of Mk II fractional horse power single- and three-phase motors from $\frac{1}{6}$ to $\frac{3}{4}$ h.p. with solid foot, resilient or flange mountings. The RHEOSTATIC CO. (35) are making a display of their room thermostats and thermostats for cookers while WANDLESIDE (49) and BICC (37) are showing cables and floor-warming equipment, respectively.

Back at Olympia, those who visit and envy the spaciousness and layout of the all-American and Canadian houses in the village, may note the universal use of electricity in the kitchen while the British designs offer a choice of gas or electricity. To those who pride themselves on being "as up-to-date as the Americans" this should be a significant pointer. The day may not be far distant when the really up-to-date householder dare not install anything but electrical equipment throughout his home, a frame of mind which is already being instilled by the current EDA campaign with its pertinent slogan "Get up-to-date—Go Electric."

The Revo "Glo-ray" radiant electric fire with natural glowing coal fire effect

Wetness in exhaust steam

MAGNITUDE OF ITS EFFECT ON EFFICIENCY

ONE of the limiting factors in design of a steam turbine is the wetness content of the steam at the exhaust. In recent years, this has not been of prime importance because of widespread adoption of reheat, but the advent of nuclear power stations is attracting close attention to the subject again. A paper* presented last week to the Institution of Mechanical Engineers discusses the subject in considerable detail.

It was early discovered that some energy was lost when expansion of steam in a turbine reached far into the wet range. The term "wetness loss" was coined for this, and as long ago as 1912 it was suggested that each 1% of water present in the steam would result in 2% greater consumption measured from the condensate. However, it was some time before ideas cleared as to the physical explanation of the loss. Nowadays wetness loss is regarded as being a mainly mechanical inaction, in part through the drag imposed by droplets on the steam, but more seriously by the braking action of the water droplets striking the back of the moving turbine blades. The latter action becomes obvious through severe erosion experienced in turbine blades, for which a hard metal edging has had to be adopted. It is generally accepted that maximum wetness should be limited to about 14%. Although over the last 10 years almost universal use of reheat has resulted in much lower exhaust wetness, erosion troubles have been experienced even with the 125 MW double-reheat machine at the US Philo station, where moisture at the exhaust should be only 2% or 3%.

In nuclear stations, where relatively low steam conditions are used, some designs involve removing water at one or more intermediate stages by putting all the steam through a series separator. However, taking steam out, piping it to a separator and back again, may impose a pressure drop penalty of about 5%, representing about 1% in heat drop.

Effects on Economics

After analysing the thermo-dynamics of expansion into the wet region, Mr Wood turns to the importance of wetness loss in power station economics. He makes the point that the whole structure of the economics of higher temperatures and pressures and of use of reheat turns markedly on assumptions made about the amount of wetness lost. Raising the initial temperature in a straight steam cycle by 100°F is reckoned to give about 3·5% gain in heat rate over a wide range of conditions. Without wetness loss, the gain would be only about 2·2%. Referring these figures to a 1,000 MW plant with coal at £4/ton, the difference of 1·3% in heat rate could be worth a capital sum of over £1 million. Similarly, the gain with single reheat to full temperature now agreed to be of the order 4% to 5% over wide range of conditions was at one time held to be only about 2%, because the change of wetness loss was not taken into account, nor that of reheat factor.

Thus, if it were found practicable to throw out the water mechanically by some device within the turbine, without incurring a pressure drop, this would alter the whole economics of higher temperatures and pressures. Gains by raising the initial temperature would be reduced, and those due to raising the initial pressure would increase. Reheat would show less economic merit.

Later in his consideration of wetness loss, Mr Wood discusses the turbine as a centrifuge. Considering the last row reaction blading of a last row of a turbine, he takes a token radius of 3 ft and 3,000 r.p.m. speed; then the centrifugal acceleration is 10^4g. The steam accommodates itself to the higher radial force by pressure gradiant, and does not itself move radially. However, free water particles, because of their high relative density, are unable to resist centrifugal force. Despite this, the water is not centrifuged from the steam with much effect. Rather it agglomerates as a concentration of dense spray in an outer anulus.

In the concluding section of his paper, Mr Wood discusses factors controlling erosion and energy loss, concluding with the most fruitful way of reducing the magnitude of these is to get rid of the water to feed heaters. This ensures that there is considerable advantage in placing the first feed heater low down in the cycle, where the prospective wetness is high. Later, replying to the discussion on his paper, he remarked that heat release of the braking loss due to wetness could be startling. A 30 MW machine with a 2% braking loss would dissipate 600 kW in a space of about 60 cu ft; or 34,000 B.Th.U./cu ft, which was a good deal more than the heat released in a combustion chamber of a boiler.

Mr Wood also describes types of steam separators becoming available, including those used for the geothermal scheme in New Zealand. He gave attention as well to use of fluids other than steam, but concluded that in general difficulties resulted in greater disadvantages other than those associated with wetness loss from steam.

Discussion

Discussion on the paper ranged widely and again produced individual remarks of significance. For example, Mr F. Dollin (C. A. Parsons) suggested that developments in blade tip speeds seem to be approaching the stage at which even the hardest and toughest materials would have only a relatively short life. This idea seemed to have support from Mr E. Webster (CEGB) who said that the CEGB had concluded that if increase in capacity of turbines led to blading with peripheral velocities approaching 1,800 ft/sec the increase in water impact velocity might more than outweigh the value of water reduction from the aspect of blade damage. Mr W. Davies (AEI) said that service life appeared to be related to square of blade speed, the total weight of water and the exhaust pressure. Acceptance of the 13% wetness as a criterion of tolerable exhaust conditions was without value by itself.

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* "Wetness in Steam Cycles," by B. Wood, M.A., M.I.MECH.E., Head of Research and Development Dept., Merz and McLellan.

OVERSEAS NEWS

from our correspondents abroad

CANADA

Take-over

The Canadian General Electric Co. has purchased the business of the Montreal Armature Works Ltd. The latter concern has 85 employees and operates a 45,000 sq ft plant engaged in the repair and service of heavy equipment and electric motors.

Another Scheme

News is shortly expected of a decision by the Pembroke Electric Co., to proceed with a new power project on the Coulonge River, near Fort Coulonge, Quebec. Cost of the scheme is estimated at $2¼ million, and it is expected to take about a year to complete.

Underground Lines

The Hydro Electric Power Commission of Ontario has been asked to prepare a further estimate on the cost of underground feeder services in both the central and suburban areas of Ottawa, the city mayor, Mr Nelms, has announced. The Commission spent $700,000 on such work last year, and there are hopes that the work can be speeded up in view of the strong criticism on the unsightly overhead wiring in the centre of the city.

EUROPE

H.E. Scheme Completion

The Demirköprü dam and hydro-electric installations on the Gediz River in Western Anatolia, Turkey, have been completed at an overall cost of £T409,642,000. The project will become fully operative on 15 March. The power station, with an installed capacity of 69 MW, was completed last year.

International Link

Poland, Czechoslovakia, the German Democratic Republic, Rumania, Hungary and the European part of the Soviet Union have decided—in the framework of the council of mutual economic assistance—to join their electric power systems. This decision was taken in view of the steadily increasing demand for electric power in the member countries. The creation of this international electric grid will make it possible to reduce the amount of new generating capacity to be added—a saving of 500 MW it is estimated. The proposals do not exclude the further development of the power industries in the respective countries, of course.

Railway Electrification

Electrification of the Italian State railways, under the five-year plan, is expected to be completed in 1961. Considerable progress was made last year, including electrification of the entire Adriatic coastal line from Bari to Milan, and of the Milan-Trieste line. By 1961 the electrified network will be nearly 5,000 miles in total length, of which half will be twin track.

IRAN

Additional Finance

In order to complete the Dez multi-purpose project in Khuzestan Province, the World Bank has approved a loan equivalent to $42 million to Iran. Total cost of the project, apart from power distribution networks, is estimated at $83 million, of which Iran has already spent some $15 million. This new loan will cover the foreign exchange cost of completing the project, the remaining costs being met by the Government. The dam, to be 460 ft high, is being built by the Development and Resources Corporation of New York, under the direction of Iran's Development Plan Organisation. It could later be raised to 610 ft. The power house is scheduled to contain four 65 MW sets, and to be completed by the end of 1962.

SOUTH AFRICA

Plant for Johannesburg

The General Electric Co. Ltd. have just received a £1,400,000 order for further generating plant for Johannesburg. They are to supply two more 60 MW turbo-generators for the Corporation's Kelvin "B" power station. GEC have already provided the six 30 MW sets, installed in the "A" station, and are supplying machines for the initial stage of the "B" station. Merz and McLellan are consultants for the project.

NIGERIA

Using Gas

A new power station is soon to be built at Shell-BP's oilfield at Afam, in Nigeria, where reserves of natural gas are estimated to be sufficient to provide it with power for 20 years or more. The new power station will cost £1½ million; gas turbine plant will be used to drive 20 MW generators, we understand. These will feed current into a 132 kV Aba/Port Harcourt transmission line, which is already under construction. At present 1,500,000 cubic feet of gas is burnt off each day to prevent any possibility of it becoming a danger to the neighbourhood.

INDIA

Supergrid Plans

The introduction of a supergrid system for the transmission of power in the country as a whole is being considered by the Government of India, Mr Jaisukhlal Hathi, Deputy Minister of Irrigation and Power, revealed a few days ago. Details of the scheme have yet to be formulated, but as a step towards the establishment of an all-India supergrid system, the Central Water and Power Commission has undertaken preliminary studies for a grid for the southern region comprising the States of Andhra, Madras, Mysore and Kerala. It is proposed to undertake similar studies for other regions in the country in due course.

Stone-laying

The chief Minister of Bihar recently laid the foundation stone for the new Barauni thermal power station at Chakia, which is also the site of the proposed oil refinery. The plant for this station is being supplied by Yugoslavia.

Supplies for Railways

The Uttar Pradesh government has decided to supply power from the Rihand project for the electrification scheme of the railways. During the first two years the supply will be 40 MW. Transmission lines and other necessary auxiliary works and equipment will be provided. The supply is to be given at Karanmasa and Sonenagar, in Bihar. For this purpose a 132 kV double-circuit line will be constructed from Moghalsarai to Karanmasa by the State Government. The other line from Pipri to Sonenagar will be constructed by the Bihar Electricity Board. The cost of works to be carried out by the UP Government for supplying power to the railways is estimated at Rs35 lakhs. This amount will be provided by the Government of India as loan assistance. Meanwhile the State Government has decided to set up a 45,000 kW thermal plant somewhere in south east UP.

PAKISTAN

Bogs Surveyed

With the aim of reducing reliance upon imported fuel, the utilisation of peat bogs in East Pakistan for industrial power and electricity supplies is under consideration by the Pakistan Industrial Development Corporation. To this end, they have enlisted the aid of two officials of Eire's Board na Mona, who have just returned from a three weeks' visit to Pakistan, during which they surveyed about 200 sq miles of peat bogs. The two officials have indicated that they found drying conditions at the bogs there exceptionally good, whereas in Eire, turf could only be cut in the summer months. They also found that the quality of the peat in Pakistan was excellent—it was good black peat from top to bottom. But one difficulty was the fact that the bogs were flooded for about six months each year, in places up to a depth of 10 to 12 ft. This problem could be overcome by the erection of dykes, which would also benefit people who wanted to work the land. The officials are submitting their report to the Corporation.

INDONESIA

More Finance

The Washington Export-Import Bank has just granted a credit of $14·3 million to the Government of Indonesia to aid the construction of a thermal power plant located at Surabaya, East Java. The new plant, of the semi-outdoor type, will be erected on a harbour site close to cooling water and will consist of two 25 MW turbo-generators fed by two boilers rated at 240,000 lb/hr. The equipment will be designed to burn either oil or coal. Initially, oil will be used, but as Indonesia develops its coal resources, a changeover to coal is planned. The city of Surabaya will be the principal user of the current generated by the new plant. The Westinghouse International Co. will perform design and engineering, supply plant and supervise construction.

S. VIETNAM

Changeover

The decision has been taken that the standard distribution voltage throughout South Vietnam is to be raised from the present 110/280 V to 220/380 V a.c. 50 cycles. The changeover will, of course, be slow, but it is suggested that there should be a good market for conversion equipment, including small domestic transformers, in addition to better prospects for manufacturers of appliances.

AUSTRALIA

Power Outlook

Australia will have to spend more than £500 million on generating plant alone to meet the growing demand for electricity in the next ten years. The Commissioner of the Snowy Mountains Hydro Electric Authority (Sir William Hudson) said this in an address to the citizenship convention last month. He said the development of electric power resources was a major requirement for the expansion of industries, which was essential if Australia was to achieve the population increase necessary to secure the future. For many years the increased power demand on mainland Australia would undoubtedly be met by the establishment of additional coal-burning generating stations on the coalfields of NSW, Victoria and Queensland. Nuclear power would not become competitive with coal for power generation except in remote areas for many years. The Snowy scheme would provide most of the peak load requirements of NSW and Victoria for some years. The potential for power development was almost unlimited in these two States, and to a lesser degree in Queensland, he maintained.

French Order

Nine 132 kV transformers have been ordered from a French manufacturer by the Electricity Commission of New South Wales. The order, valued at over £500,000, has just been placed through Afca Pty Ltd. The transformers are for use in the Commission's regional substations in the Sydney metropolitan area.

End of an Era for Salisbury

ALTHOUGH a recession affected commerce and industry generally in the Federation of Rhodesia at the time, total unit sales by the City of Salisbury Electricity Department in the year ended 30 June last increased by 17·3% to over 432 million. Of that total, 30¾ million were for bulk supplies. Domestic consumption alone amounted to over 205 million units, average domestic consumption for the year increasing by 118 units to 8,589. In his annual report for the year, Mr J. E. Mitchell, the city electrical engineer, also draws attention to the rapid increase in consumption for industrial purposes—Salisbury can now claim to be a major centre of industry within the Federation.

The distribution section of the department again had a very busy year, adding 160 miles of new mains, connecting 100 substations and 3,214 new consumers, but those figures were not quite as high as in the previous year, due mainly to a slowing down in general house building. Altogether, the section spent a total of £1,095,056 on various works, but shortage of funds has limited the allocation for the current year to £950,000. Even so, it is considered that the section is at last beginning to cope with the rate of expansion, although no slackening off is anticipated.

The use of "packaged" substations is being considered, as it is felt that they could prove a definite saving where installed in the outlying areas. The department is also carrying out extensive development work in connection with native housing. One African housing estate was completely equipped with individual meters for the first time. There, the average consumption for the estate is about 250 units per month per consumer. In other estates load-limiters are used. The electrical installations in these native domestic premises are usually of a simple nature and maintenance presented some difficulties because of the large number of buildings, unauthorised extensions to installation and abuse of fittings. In three communal kitchens, also all-electric, a total of over 1,000 kW of load was connected.

The department's installation inspectorate also reports that screwed conduit is still the most used wiring system, although the use of metal trunking in the larger installations is increasing. For normal wiring, p.v.c. insulation has almost finally supplanted v.r.i., and more miniature circuit-breakers are being installed than ever before, although warning is given on the need for vigilance to guard against their misapplication. The Department also carries out street lighting work throughout the area, spending about £50,000 annually on such operations, and manufactures its own concrete poles. A polished terrazzo pole has been evolved, suitable for civic centres, parks and areas where aesthetic considerations predominate. Prototype production figures indicate that its final cost will be some 20% below that of any outside offer for a plain unpolished concrete pole of similar design, it is stated.

That apart, Mr Mitchell reports that practically no foreign countries appear in the Council's annual requirements of materials, etc., the only exception being in regard to lightning arresters where the tender of a Swiss firm was accepted. Deliveries from UK firms continue to improve and it is now exceptional for delivery periods to be other than quoted.

On the generation side, the new No. 3 power station, with two 30 MW sets, provided 64·6% of the system's total output, with a thermal efficiency of 27·27%—the highest in the Federation. Total plant capacity is 120 MW, and the maximum load carried was 112·1 MW, an increase of 14·4%.

It is with obvious regret that Mr Mitchell also reports that control of generation of electricity is now passing to the Federal Power Board, with the latter's main transmission lines from Kariba interconnecting with Salisbury. (The situation will then be reminiscent of our old CEB days.) Although Salisbury will have lost a measure of autonomy, he may well be proud of the fine achievements of his department throughout its 46 years as an individual municipal undertaking.

Personalities *in the industry*

Mr A. E. Strong

Mr K. A. Fillmore

Mr D. I. S. Hinton

Mr R. J. Mant

Mr R. D. Lewis

The Engineering Department of the East Midlands Electricity Board at headquarters has been reorganised and new appointments, operative from 1 March, are announced, but **Mr A. G. Connell,** M.I.E.E., M.I.MECH.E., F.INST.F., remains as chief engineer of the board. **Mr A. E. Strong,** B.SC., M.I.E.E., A.M.INST.C.E., who was previously chief assistant engineer, has been appointed deputy chief engineer, with overall responsibility to the chief engineer for co-ordinating the work of the department. **Mr H. Cox,** M.I.E.E., M.AM.I.E.E., A.M.B.I.M., formerly assistant chief engineer, transmission, planning and construction, is now designated assistant chief engineer, planning and design. His senior assistants are **Mr G. F. Longfield,** A.M.I.E.E. (transmission) and **Mr S. B. Richards,** A.M.I.E.E. (distribution). **Mr A. Elder** who was previously regional engineer, becomes assistant chief engineer, operation and construction. His senior assistant is **Mr W. Wynn-Owen,** ASSOCIATE I.E.E. (construction). Finally **Mr H. W. Oldham,** M.A., M.I.E.E., formerly assistant chief engineer, operation and maintenance, is appointed assistant chief engineer, technical. His senior assistant is **Mr L. F. Garner,** A.M.I.E.E. (meters, testing and instruments). (*ESH, page 107.)

Personnel officer to the Southern Electricity Board, **Mr J. W. K. Evans,** B.A., has been appointed secretary of the North Western Electricity Board. He succeeds Mr J. W. Chant, M.L.S., F.C.C.S., who has retired, as we earlier recorded (*ESH, pages 86 and 147). Mr Evans, who is 45, was educated at Holt Grammar School and Liverpool University. At the outbreak of war he joined the Royal Artillery. Later he had wide administrative experience on the General Staff in the Middle East and was demobilised with the rank of Lt-Col. In 1948 he was appointed assistant secretary to the Merseyside and North Wales Electricity Board, his duties including a term as secretary of the Electricity Consultative Council for that board's area. Two years later he joined the Southern Electricity Board as secretary to its Newbury (Berkshire) sub-area.

Mr K. A. Fillmore has been appointed Divisional sales manager, Leigh Works, of British Insulated Callender's Cables Ltd., as from 1 March. He succeeds **Mr D. I. S. Hinton** B.A., who is taking up an appointment with BICC-Burndy Ltd. Mr Fillmore was educated at City of London School and joined the Telegraph Construction and Maintenance Co. Ltd. in 1938. After war service with REME, he returned to Telcon, and ultimately became sales manager, Plastics Cable Department. A short period with Permanoid Ltd. (Manchester) followed, and in 1956, Mr Fillmore joined W. T. Glover and Co. Ltd., becoming home sales manager, which post he held until his appointment to BICC. Mr Hinton was educated at Merchant Taylors and, subsequently, at Emmanual College, Cambridge, where he obtained a B.A. in Mechanical Sciences. He served a one-year apprenticeship with Vickers Armstrong Ltd., before joining BICC in 1954 as sales engineer (aircraft cables). He held this position until his appointment in November, 1958, to divisional sales manager (rubber cables).

Formerly chief engineer of the firm's Electrical Division, **Mr R. E. Grout** has been appointed vice-president of the Shawinigan Engineering Co. Ltd.

The Senate of the University of London has conferred on **Mr R. S. Edwards,** who is a deputy chairman of the Electricity Council, the degree of Doctor of Science (Economics) for his work in the field of industrial organisation and cognate fields. Until recently Mr Edwards held the Chair of Economics (with special reference to Industrial Organisation) in the University of London, but has now resigned this appointment to concentrate on the affairs of the Electricity Council.

Mr Robert J. Mant, formerly deputy divisional manager of Electrolux Ltd.'s London Division has been appointed to the general sales manager's staff at the company's head office. His successor as deputy divisional manager is **Mr Ronald D. Lewis,** who was formerly an area manager in the London Division. Mr Mant, who is aged 47, joined Electrolux Ltd. in 1950 as an area manager, and was promoted deputy divisional manager in 1954. He began his career in 1927 in the electricity department of Ilford Borough Council and was later a showroom assistant. In 1934 he joined the South Metropolitan Electric Light and Power Co. as a showroom manager, to which position he returned after war service in the Royal Navy. Mr Lewis joined Electrolux Ltd. in 1953 as a contracts area manager with its Scottish Division, and afterwards transferred to the company's Eastern Division.

Mr J. Worswick, commercial manager for the past 12 years of Moorwoods Ltd. has been appointed a director of the company and will be responsible for sales.

Mr R. E. Landsbert has been appointed a director of Marryat and Scott Ltd. and Marryat and Place Ltd., two of the operating companies of Marryat and Scott Holdings Ltd. Mr Landsbert was apprenticed to the late Howard Marryat over 40 years ago and has spent a lifetime in the Lift Industry. He was chairman of the National Association of Lift Makers in 1954-56 and represents the association on several BSI and other committees. His duties with the Marryat and Scott group will involve expansion of the service and maintenance organisation to cover lifts, escalators, paternosters, and electrical equipment.

Chairman and joint managing director of Lec Refrigeration Ltd., **Mr C. R. Purley** has just returned from a month's visit to Canada and the USA with a briefcase full of orders for refrigerators worth about £250,000, we understand.

Mr D. W. Bray, B.SC., A.M.I.E.E., who recently resigned his appointment as branch manager—Manchester, of Brush Electrical Engineering Co. Ltd. to join Aircraft-Marine Products (Great Britain) Ltd. as northern area sales manager, has now been appointed engineering manager. As from this month he is operating from Amplo Hse, London.

Mr T. D. Childs, M.B.E., has been appointed Scottish manager for Dorman and Smith Ltd. and DS Plugs Ltd. Formerly Scottish representative for those concerns, he will operate from 73 Robertson St, Glasgow C.2. Earlier he was sales engineer at the Glasgow office of Siemens Electric Lamps and Supplies Ltd.

Chief instrument engineer of the development and engineering group of the UK Atomic Energy Authority since 1954, **Mr K. R. Sandiford** B.SC.(ENG.), has joined Hagan Controls Ltd.—one of the Plessey group—as general manager. After gaining wide experience of the instrument industry, Mr Sandiford was responsible during the war for production of fire control instruments for British coastal artillery. He has served on the committee of the Manchester section of the Society of Instrument Technology.

As from next month, the Midlands Electricity Board is combining its Smethwick and West Bromwich districts. The merger coincides with the retirement of **Mr G. Fisher,** manager of the present Smethwick district. The manager of the present West Bromwich district, **Mr H. T. Timberlake,** A.M.I.E.E., will become manager of the new enlarged district embracing West Bromwich, Smethwick and Oldbury. (*ESH, page 117.) A native of Northern Ireland, Mr Timberlake gained early experience with electricity supply undertakings in Belfast and Bangor, Co. Down. When the Electricity Board for Northern Ireland was formed in 1932 he became manager of the Newtownards district, moving in 1936 to the Brentwood Electricity Supply Co. in Essex as engineer and manager. In 1945 he was appointed deputy engineer and manager of Harrogate Corporation Electricity Supply Department, becoming planning and development engineer for the Harrogate sub-area of the North Eastern Electricity Board in 1948. In 1951 he joined the North Western Electricity Board as commercial engineer at S.W. Fylde and in 1954 he was appointed by the Midlands Electricity Board as manager of the West Bromwich District. Mr Fisher started his career with the Mansfield and Derby electricity supply undertakings, moving in 1923 to New York, where he was transmission and distribution inspector for the United Electric Lighting and Power Co. Returning to this country in 1925 he joined the former Shropshire, Worcestershire and Staffordshire Electric Power Co., serving as deputy district manager at Redditch and as district manager at Tewkesbury, Halesowen and Quinton. When the MEB was established he became district manager at Smethwick, remaining in this capacity when the district was amalgamated with Oldbury District in 1955.

Mr Norman Readman, managing director of the Consolidated Pneumatic Tool Co. Ltd., London, a wholly owned subsidiary company of Chicago Pneumatic Tool Co., New York, has also been elected to the board of directors of the New York parent company.

Measuring Instruments (Pullin) Ltd. have retained the services of **Mr G. Hoffstead,** F.S.I.A., as design consultant.

Mr B. Heath, D.F.C., M.A., managing director of Powell Duffryn Carbon Products Ltd. and a director of other companies in the Powell Duffryn Group, relinquished his Powell Duffryn appointments on 29 Feb. to take up another appointment. Following Mr. Heath's resignation. **Mr R. Turner,** M.I.MECH.E., acting managing director of Powell Duffryn Technical Services, has joined the board of Powell Duffryn Carbon Products as deputy chairman, and **Mr F. W. Stokes,** a director and the present works manager of the company's factory at Hayes, has been appointed general manager.

Mr H. G. Carter and **Mr S. G. Munday** have resigned from the board of Lancashire Dynamo Holdings Ltd.

Managing director of the National Gas and Oil Engine Co. Ltd., **Mr J. E. Smith** has been elected to the board of Mirrlees, Bickerton and Day Ltd.—both members of the Hawker Group.

Mr F. Vincent Everard, a director of several engineering firms, including Belliss and Morcom Ltd., has been elected president of the Engineering and Allied Employers' National Federation.

Appointments to the boards of two Hoover subsidiaries are announced. **Mr H. D. Vigers,** secretary of Hoover, and **Mr C. J. Hodges,** works manager of Hoover (Electric Motors) have been appointed directors of Hoover (Electric Motors) Ltd. **Mr F. A. Austin,** works manager of Hoover (Washing Machines), and **Mr H. J. Furness,** commercial research manager of Hoover, have been appointed directors of Hoover (Washing Machines).

Sir Cuthbert Clegg has been appointed to the board of Stone-Platt Industries.

Commercial officer of the Fife area of the South of Scotland Electricity Board, **Mr J. Burnett** has retired after 39 years' service in the region. He started his career as an electrical engineer with the Fife Coal Co., and after war service joined the Fife Electric Power Co.

Following his visit to Egypt as leader of the British Trade Mission to the United Arab Republic, the **Hon. H. G. Nelson,** managing director of the English Electric Co. Ltd., is now visiting Ethiopia (where he will be till 7 March) and is then to visit the Sudan from 7-12 March in his capacity as industrial leader and vice-chairman of the Advisory Council on Middle East Trade. The object of the visits is to assess trade prospects with these countries, and to make personal contacts with Ministers, Government officials, and members of business communities.

Dr E. A. J. Hall, B.SC., PH.D., M.I.E.E., has been appointed technical director of Epsylon Industries Ltd.—a member of the Stone-Platt Industries group.

Capt H. Leighton-Davies, assistant managing director of the Steel Co. of Wales Ltd., is to succeed Lord Monckton as chairman of the Industrial Welfare Society Council.

Mr Duncan McDonald has joined the board of Bruce Peebles and Co. Ltd.

OBITUARY

Mr H. J. Stone, a director and general manager of British Insulated Callender's Cables Ltd., died on 24 Feb., aged 64. He was also deputy chairman of British Insulated Callender's Construction Co., British Insulated Callender's (Submarine Cables) Ltd. and of British Copper Refiners Ltd., and chairman of British Insulated Callender's (Export) Ltd. He had been general manager of BICC since December, 1954, and a director since March, 1950. He joined the former BIC at the end of the first world war.

Mr M. Mervyn, general president of the Electrical Trades' Union (Ireland) has died aged 63.

Mr D. A. V. Rist, managing director of Rist's Wires and Cables Ltd., died on 25 Feb. aged 72. He originally started in the battery trade with a small

Mr T. D. Childs

Mr K. R. Sandiford

Mr H. T. Timberlake

** Denotes revision to the "Electricity Supply Handbook, 1959."*

company in 1902, and by 1916 had become owner of the business. In 1933 he changed its name and scope to Rist's Wires and Cables Ltd. of which he was managing director, and continued to take an active part in the operation of the business, being at the works on the day prior to his death.

Mr G. Florence, power station superintendent at Peterborough generating station, Eastern Division, CEGB, died recently aged 57. He had served at the station since 1928 (*ESH, page 50).

Mr P. S. Hall, of John F. Hall Ltd., electrical contractors of Burton-on-Trent, died recently.

We deeply regret to report the death of **Mr F. C. Fenton,** O.B.E., at Johannesburg on 26 Feb. He was aged 66, and had only retired from the office of chief commercial officer of the London Electricity Board in June, 1959, after nearly 50 years in the Electricity Supply Industry. He entered the industry in Oct., 1910, joining the Bournemouth and Poole Electricity Supply Co. Ltd. as a pupil improver. After gaining experience in generation, distribution and metering, he transferred to the commercial side. In 1916 he took control of consumers' service and became responsible for the development of supply, and in 1921 was appointed consumers' engineer with responsibility for development, showrooms, trading, meters and consumers' service. In 1930 he was appointed assistant to the manager of the Bournemouth group of companies, being responsible for reorganisation of the companies into a co-ordinated group and for direction of all commercial matters. In 1941 he was appointed area manager, South East, of the County of London Electric Supply Co. responsible for management of the Camberwell, Bermondsey and Southwark districts of that company, and of the South Metropolitan Electric Light and Power Co. Ltd. In 1944 he was appointed acting secretary of Clesco and its 21 associated companies, and in 1945 joint manager. In addition he was joint manager of the Lower Thames Land Development and Construction Co. Ltd., and a director of Tricity Cookers Ltd. With the formation of the LEB he was appointed chief commercial officer, a post he held until retiring last June. His services to the Electricity Supply Industry were recognised in the 1953 Birthday Honours when he was made an O.B.E. In March and April of 1953 Mr Fenton made two visits to Cyprus for the purpose of advising the newly established Electricity Authority on their tariff problems and in April, 1959 he also visited Rhodesia in a consulting capacity.

Mr F. C. Fenton

BRITISH STANDARDS

Terminal markings for electrical machinery and apparatus. *BS 822 : 1959. Part 5. Price 3s.* The fifth part of the revision of the 1938 standard, this deals with terminal markings for the input terminals of composite apparatus, that is, apparatus comprising different components which are permanently wired together. Parts 3 and 4 were covered in the announcement on page 242, 17 Sept., 1959, issue.

Paper Covered Copper Conductors. *BS 2776 : Pt. 1 : 1959. Price 6s.* The original issue of BS 2776 in 1956 dealt only with rectangular, paper-covered copper conductors. This latest issue deals with round, paper-covered copper wires and conductors and, in line with current practice for British Standards, is now designated Part 1, the original issue being designated Part 2. It lays down the specification of copper for, and the dimensional tolerances of, the conductors from 0·010 to 0·192 in. nominal diameter together with thickness, grade and properties of the paper insulation, tests and test methods.

Heavy Duty Air-Break Switches and Fuses. *BS 3185 : 1959. Price 5s.* This is a new specification covering the design aspects of composite units, comprising an airbreak switch and fuses with a normal current rating of not more than 800 amp and up to four poles, for service on supply systems not exceeding 600 V between phases or 380 V to earth.

It lays down nine current ratings from 60 amp to the maximum of 800 amp, with 750 amp given as an alternative for the latter for existing units until superseded by new designs. Either metal or insulating material is permitted for the enclosure, and there is the usual provision that the cover may not be opened normally until the switch is fully opened, but that provision must be made for a "competent examiner" to be able to override the interlock and operate the switch. Flashover distances are specified somewhat negatively by laying down that the unit shall be capable of withstanding a test voltage of 2 kV, a.c. applied for 1 min. A footnote comments that there is at present insufficient evidence on which to determine the minimum safe creepage distance, but the standard does recommend creepage paths of at least ½ in. at 250 V, and of ¾ in. at higher voltages and for mining gear.

Impregnated-asbestos-covered copper conductors. Part 3: Round wire; metric units. *BS 1497: Part 3: 1960. Price 4s 6d.* An addition to the series of publications giving metric versions of standards for covered winding wires, this document virtually repeats the requirements previously set out in Part 1 of the standard, the essential difference being that metric measure is used throughout. A complete range of standard metric sizes is given.

Enamelled copper conductors. Part 1: Round wire. *BS 3188: Part 1: 1960. Price 7s 6d.* One of a series of standards for winding wires with various types of covering, this standard has been prepared at the request of manufacturers and users to provide a specification for enamelled wire with self-fluxing properties, which has become an established product in the electrical industry. The series as a whole will deal with self-fluxing enamels which have a polyurethane base. The present document is concerned with round wire; remaining parts will cover rectangular wire and round and rectangular wires with metric dimensions. Its requirements are generally similar to those of BS 1844 and BS 3160, which deal with other kinds of enamelled wire, but there is additionally a solder test to ensure that the self-fluxing properties are adequate. Fine and medium coverings are specified over a range of wire sizes from 0·0016 in. to 0·064 in. diameter.

Mineral-insulated cables. Part 1: Copper-sheathed cables with copper conductors. *BS 3207: Part 1: 1960. Price 5s.* Although m.i. cables have been standardised dimensionally since 1949, by virtue of their incorporation in BS 883, *Cables and flexible cords for electrical equipment of ships,* this present document is the first standard to give a complete specification for such cables, with tests. The dimensions given previously have been retained but they are presented somewhat differently, being no longer related to drill sizes. They are now given as standard values with tolerances of ±0·002 in. Requirements are also laid down for the thickness of the copper sheath, with negative tolerances on this value of 0·004 in. for cables up to and including ½ in. diameter and of 0·006 in. for cables greater than ½ in. diameter.

Two classes of cable are specified, those previously known as 250 V cables are now classified as 440 V cables whilst the 660 V classification remains unchanged. Both classes are suitable for use at the relevant voltage either between conductors or between conductor and sheath. Provision is made to include an overall p.v.c. sheath if required. Tests are laid down for determination of sheath thickness, integrity of sheath and insulation resistance for a unit length. It is hoped later to publish standards dealing with similar cables having other types of conductor, insulation and sheath.

Safety Requirements for Radio (including Television) Transmitting Apparatus. *BS 3192 : 1959. Price 6s.* A new specification dealing with the safety requirements to be observed in the installation of radio transmitters on land, sea and in the air, this is solely for the use of the radio and electronics industry.

Copies of British Standards noted above may be obtained from the Sales Branch, BSI, 2 Park St, W.1, at the prices stated, postage being charged extra to non-subscribers.

Displays for Designers

LATEST MATERIALS, COMPONENTS AT ENGINEERING DESIGN SHOW

IT is frequently the case that materials, both conventional and modern, are being developed at such a rate that few designers can hope to keep pace with the growth. Particularly useful, therefore, in providing an up-to-date review of latest materials and components, was the Engineering Materials and Design Exhibition last week at Earls Court, held in conjunction with a conference covering a large number of modern developments.

The event was the first of what is likely to become a popular event, with between 60 and 70 firms represented. Exhibits covered virtually the whole sphere of engineering design, but could be broadly classified into three main groups: plastics, metals and metal components and bearings.

Plastics, and other non-metallic bearings were strongly in evidence. One interesting exhibit was bronze bearings impregnated with p.t.f.e., shown by Bound Brook Bearings Ltd. These have been devised for special applications where fluid lubrication is not permissible and provide dry-film lubrication with low coefficient of friction. Another material suitable for use as a bearing in special applications was Nylatron GS, a nylon 66 filled with molybdenum disulphide, this being shown by Polypenco.

Bearings were also shown by a firm well known for its electrical engineering materials, the Morgan Crucible Co. On the one hand they had their Reservoil sintered metal oil bearings, which can be supplied in stainless steel, copper-iron and other alloys, as well as the usual bronze. On the other, they showed Morganite carbon bearings for use where circumstances where lubricants must be avoided or present corrosion problems with other bearing materials.

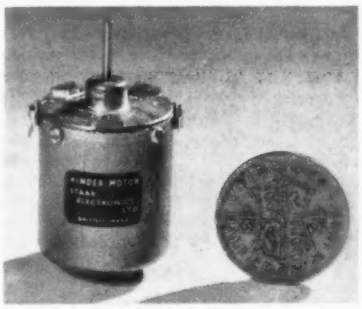
Needle Bearings

One particular development which featured prominently was that of needle bearings of various types. Their main advantage is combination of light weight and compactness with high load-carrying capacity. For use in electric motors, however, the comment was made that they are suitable only where the shaft has been case hardened. One application suggested by Torrington Bearings is that of heavy-duty portable electric drills where the size of the unit must, of course, be kept within the limits imposed by manual handling, but where high radial and thrust loads are likely to be encountered.

For machine tools and other precision equipment, where, in these days of automatic position control, dimensional tolerances are particularly stringent, Insley Industrial Supply Co. have recently introduced super precision needle bearings, which incorporate a special method of radial play adjustment.

Plastics Materials

As would be expected, plastics materials were represented in an almost bewildering variety. The Plastics Group of the Distillers Co. showed a wide range of materials having application in electrical engineering, notably Rigidex high density polyethylene, which is suitable as a structural material in domestic appliances such as spin dryers, refrigerators and floor polishers. Another of their materials was Rockite polyester dough moulding



Fractional h.p. motor designed for tape recorders and record players by E. G. Irwin and Partners, who offer a complete design service for industry

compounds which possess good mechanical, thermal and electrical properties.

Another novel plastics material with electrical uses was Fibreform, described by Fibre Form Ltd., as a reinforced moulding material. It is made from cellulose fibres bonded by a special phenolic resin. Moulding is carried out in two stages, a preform is made to the required shape, and then moulded to the correct thickness. It can be produced in thicknesses up to $\frac{1}{4}$ in.

For the installation designer, Durable Plastics Ltd. were displaying a sample length of conduit, complete with box, and saddle-mounted to cable tray, which had been given a plastic coating to combine the qualities of steel with the corrosion resistance and insulation of plastics. This coating is a service they offer in p.v.c., polythene, p.t.f.e., nylon, and neoprene and may be applied by moulding, dipping or spraying.

An encapsulating material recently introduced by Midland Silicones is a cold curing silastomer rubber; the example displayed was of typical electronic equipment encapsulated in this material.

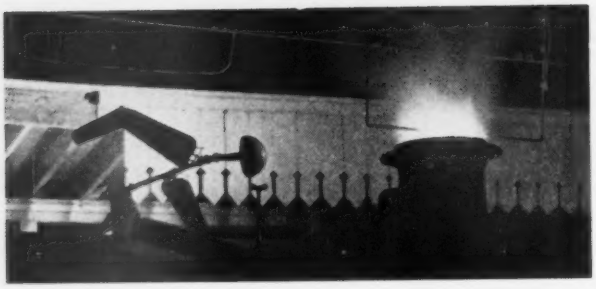
Conventional materials for thermal insulation are finding competition from foamed plastics, of which ICI were featuring poly-isocyanates which are used in the production of rigid and flexible foams for insulating purposes.

Metal Developments

Turning to metals, a particularly interesting development was a new protective finish developed for aluminium, by PMD Chemicals Ltd. Known as alchromate, it is a chemical process which converts the oxide layer normally present on the aluminium into an electrically conducting layer which offers resistance to salt-spray and other forms of corrosion to which the metal is prone.

As already mentioned, metal castings were represented in some profusion and it is not possible to refer to more than a few displays. Ferranti were showing components, such as electric resistance grids, cast in their spheroidal graphite iron, a material also displayed by several other firms. Precision casting by the lost wax process was displayed by PI Castings, with many examples of the intricate shapes it is possible to produce accurately by this means. Methods of working beryllium were featured in a very comprehensive display, devoted exclusively to this metal by the Atomic Weapons Research Establishment, who have been carrying out an intensive research programme on it for the last seven years.

Motor end-shield moulded for Foster Transformers by Minerva Mouldings from British Resin Products' "Rockite" dough moulding compound



Railways prove safety at 25 kV

Demonstrating safety of normal clearances on the British Railways 25 kV overhead line systems. This flashover did not occur until the line was lowered to only 2 in. above the locomotive chimney. Men on the footplate and platform were unaffected

A FEW unfortunate accidents on recently electrified sections of British Railways track and subsequent Press reports have caused some public concern about safety of railway workers and passengers with the 25 kV system. Anxious to dispel these doubts, British Railways recently arranged a safety demonstration showing that provided railway regulations are adhered to, there was ample safety margin for both the public and railway staff.

The demonstrations were given at Colchester before trade union representatives, officials of the Ministry of Transport and railway officers. Commenting on what they had seen during the demonstration, Brigadier C. A. Langley, Chief Inspecting Officer Railways, Ministry of Transport, said that they were convinced that the 25 kV system was not dangerous to passengers or any person going about his lawful business, nor to railwaymen, so long as the safety rules were obeyed. He said the tests had clearly shown that clearances between contact wires and either a structure or a train provided an ample margin of safety and that there was no danger to anyone legitimately on an engine. On the other hand, the tests clearly showed the results of failure to observe the safety rules.

In the first demonstration, a steam locomotive was positioned beneath a wire loop suspended from the 25 kV overhead line. The line was energised and the loop lowered from its normal operating height first to 11 in. above the locomotive chimney, then to 5 in. and, finally, to 2 in. when flashover occurred. Safety was demonstrated by men standing on the footplate, on the station platform while grasping the locomotive hand rail, and also by a man standing with one foot on the footplate and the other on a plate connected to the running rail. None of the men was harmed when the flashover took place. The flashover distance of 2 in., considerably less than normal running clearance, represented the worst possible condition with the engine emitting much smoke.

Safety regulations specify that certain classes of railwaymen are forbidden to work closer than 9 ft to an overhead line unless power has been cut off. To emphasise that this distance included an adequate margin of safety and, in fact, has nothing to do with the distance across which a discharge could pass, a dummy man was placed astride the locomotive boiler. The dummy had the same resistance as a real person and was placed in a slumped forward position. The dummy body was then slowly raised to a sitting position and it was not until the head was within 1 in. of the line that flashover occurred. The test was repeated with the dummy sitting on the tender and similar results were obtained.

Finally, high voltage surges were applied to the line to simulate conditions likely to arise in a thunderstorm and, again, men stood on the locomotive or grasping the handrails, with safety.

MOBILE OIL CLEANING PLANT

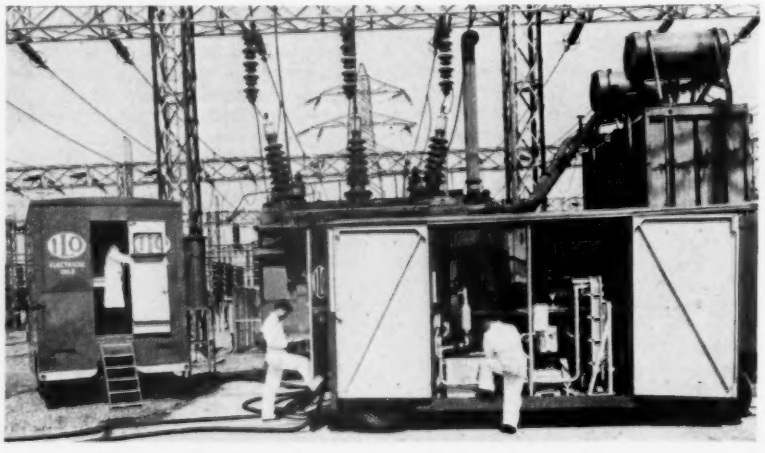
SPEEDY restoration of cleanliness and high insulation properties to transformer oil is achieved with the mobile "Ilovac" oil treatment plant recently introduced by Wakefield-Dick Industrial Oils Ltd.

The plant consists of a lorry and trailer carrying all necessary treatment equipment and a laboratory for testing air and moisture content and checking electrical properties of the oil. The laboratory and cleaning operations are supervised by one of the company chemists.

Principle items in the treatment plant are a high speed centrifuge, vacuum pumps and oil heaters. Untreated oil from the transformer passes first through a heat exchanger and then into a heater with a maximum loading of 144 kW. Maximum heating load would probably be required only when drying out a transformer when the heat exchanger would not be used. The oil, heated above the boiling point of water at the vacuum used, passes into a high speed De Laval centrifuge where free water and solids are removed. The cleaned oil then enters a vacuum tank where further moisture and entrained air is extracted. The clean and dry oil returns through the heat exchanger to the transformer.

During a typical servicing operations it was possible, in a single pass, to reduce dissolved air content from 11% to 5% by volume and moisture from 30 p.p.m. to 13 p.p.m. At the same time, electrical strength rose from 30 kV to over 75 kV. These results were obtained with an oil flow of nearly 1,200 gal/hr.

The equipment ensures not only that oil is effectively dry and free from entrained gas, but also that it is sufficiently absorbent to remove any moisture or air pockets existing in the transformer insulation.



The Ilovac mobile oil cleaning plant being prepared for use. The equipment removes solids, water and entrained air from transformer oil and includes comprehensive laboratory facilities for testing oil quality and insulation resistance

PROBLEMS AND PRACTICE

We welcome contributions to this feature; those published will be paid for at our standard rates. There must be many problems encountered in day-to-day electrical work, or useful ideas or tools devised to make it easier; all make instructive reading.

Asking for trouble

MY work involves having to investigate breakdowns of electrical equipment, and it is surprising that there is such a large number of breakdowns which, with a little care, could have been avoided. It seems that the people concerned are continually asking for trouble.

An outstanding example of this sort of thing resulted in the fracture of the drive-end shaft of 1 h.p. induction motor, as shown in the accompanying sketch (Fig. 1). The fracture was hardly surprising, as the shaft had carried a 2 in. pulley (not shown) which had been drilled off-centre and therefore created considerable out-of-balance. To make matters worse, the pulley had been fitted right at the end of the shaft and was driving a fan belt which was far too tight. The real surprise comes when it is explained that the users of the equipment repeated the performance three times with three identical motors. It was only after reaping a harvest of three broken shafts, that the firm changed the drive to a 1½ h.p. motor with a larger shaft and different pulley.

I have encountered several cases where motors were connected up wrongly by

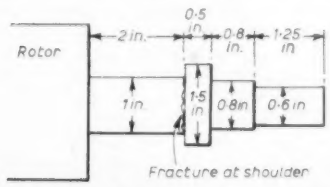


Fig. 1. Shaft fracture caused by off-centre pulley and over-tight belt; it occurred three times before proper remedial action was taken

electricians when they had no wiring diagrams. In one instance, a three-phase machine with six ends brought out, was connected in star and when it appeared to run normally in this condition it was left "as it must be connected up right." The motor became excessively warm on full load, of course, but fortunately, this was noticed and the motor reconnected in delta, as intended by the manufacturers, before damage occurred.

A similar mistake of connecting up and seeing if the thing would run was made with a single-phase capacitor-start induction motor. The circuit is shown in Fig. 2, with the motor connected correctly to the supply. Previously, however, the mains had been connected to Z_1 and Z_2, the latter being linked to A_2. As will be realised, this connection resulted in the starting winding being cut out of the circuit by means of the centrifugal switch (as intended), but the capacitor was left permanently in circuit with the running winding (not as intended). As the capacitor was only intermittently rated, it exploded after half an hour's run.

I think there was some excuse for connecting the motor incorrectly, as there was no diagram and nothing to indicate that the mains should be connected to A_1 and A_2. This indication could easily have been provided by means of distinctive terminals or tags. On the other hand, it does not seem unreasonable to have expected the electrician, if he was not sure of the connections, to have traced the internal wiring.

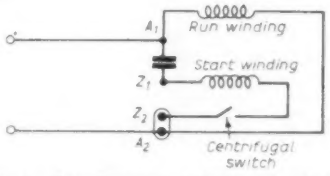


Fig. 2. Capacitor-start, induction-run, single-phase motor; because it was too much trouble to trace out the circuit, the mains were wrongly connected across Z_1 and Z_2, ultimately destroying the capacitor

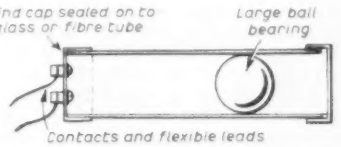
As this would have meant removing the terminal plate inside the terminal box, I assume he took a chance.

Neon testers and their unreliability have been mentioned on several occasions in these columns; the other week I was again interested to find an electrician putting all his faith in one of these things. He stated that all three phases were getting through the starter, but the motor would not budge. On mending a fuse which his neon tester indicated was intact, the motor was found to be in order.—*"Surveyor."*

On the ball

A CERTAIN mercury switch was used in conjunction with a small relay to control the operation of a weighing machine. It was found on several occasions, however, that when the switch was operated by the machine, it continued to conduct, either through the mercury vapour or just by tracking, with the result that the relay remained closed. This meant that the interlock connected to the relay failed to operate and stop the associated feeder conveyor.

The mercury switch was removed and a switch, illustrated in the accompanying sketch, was made up in the workshop. As can be seen, it comprised a tube of glass (although fibre could be equally well used) in which a large ball-bearing was placed, the ends of the tube then being closed by suitable end caps. The heads of a pair of screws fitted in one of the end caps were arranged to



Simple switch for use with a weighing machine, made up to replace a mercury switch whose operation was giving trouble

be bridged by the ball and in this way provide the switching action. The device worked quite satisfactorily in this particular application, but care should be taken if such a switch is used in counting circuits in view of the possibility of the ball bouncing as it hits the contacts.—*R.T.C.*

Conduit continuity

IT is a matter of common agreement that in any conduit system which is used for the earth return, the resistance of the earth continuity path is of great importance. Any screwed joints in a conduit system introduce a resistance which is usually much greater than that of a straight run of conduit and it is often the case that the joint resistance has a significant effect where currents at low potential, such as earth currents, are concerned. In extensive conduit systems earthed at a distant point, the total resistance of any path to the installation earth may cause the earthing to be only partially effective.

For long runs, an intermediate earth may be made by introducing a tee-piece into a length of conduit and screwing into this a length of copper rod. The other end of the rod may then be buried direct into the ground, or connected to a local earth electrode.

Where the conduit system is used as part of the earthing, it is also important to maintain a low continuity resistance, to minimise, if not avoid, stray currents passing from the conduit to any earthed metallic structures at any points of fortuitous contact. Stray leakage current flowing to earth in this way may lead in certain circumstances to local corrosion of the conduit.—*W.E.W.*

equipment for industry

Plastics sheet is easily formed

A TOUGH thermoplastics sheet claimed to have good moulding and forming characteristics, especially when used with vacuum techniques is now available. Vybak DVR 262 is formed from p.v.c. co-polymers without the use of plasticisers, so avoiding poor ageing characteristics. Intended for applications such as mouldings for refrigerator liners, trays and industrial containers, the sheet is available in thicknesses from 0·01 in. to 0·2 in. Its electrical strength is 440 V/mil and it has good mechanical properties, although recommended maximum operating temperature is 50°C. *Bakelite Ltd., 12 Grosvenor Gdns, S.W.1.*

Drying liquids and gases

MOISTURE free gases and liquids are becoming of increasing importance in a variety of industrial processes ranging from the use of dry helium for instrument filling to dehumidified wave guides for radar equipment. Plant for providing dry air is now being made with capacities ranging from only 20 cu ft per minute to large capacities meeting customer's specific requirements. Known as the GWB-Lectrodryer, the equipment incorporates adsorbing agents such as alumina to remove moisture from the gas or organic liquid treated. The adsorbent material is reactivated by a heating cycle under either automatic or manual control. Units can be supplied for continuous use with two drying chambers, one of which is reactivated while the other is in use. Alternatively, for installations operating in day time only, units with a single chamber for reactivation at night. *G.W.B. Furnaces Ltd., Dibdale Wks, Dudley, Worcs.*

Insulated nut price reduction

IMPROVED factory techniques have enabled prices of the more popular sizes of Permali insulating nuts to be reduced by an average of 16%. *Permali Ltd., Bristol Rd, Gloucester.*

Adhesive tapes for 180°C

THAT is the maximum recommended operating temperature after curing for the latest addition to the range of Gosheron tapes. Known as Transonex Thermosetting, the tape is based on ICI 0·001 in. Melinex film and is said to have an extremely stable thermosetting adhesive. The tape is claimed to have first-class electrical properties, high tensile strength and resistance to acids and alkalis. It is suitable for processes using solventless varnishing and impregnation methods. *John Gosheron and Co. Ltd., Albert Embankment, Vauxhall, S.E.11.*

Thermal-storage controller

SPECIALISTS concerned with designing off-peak floor-warming installations will be familiar with the "Repitrol" time-temperature controller. In common with other devices of this kind, the controller operates during the charging period to raise the operating point of a temperature-sensitive element until the prevailing external temperature is reached, at which point the supply circuit is switched on to energise the installation.

The firm have now brought out a modified form of this unit, in which a number of improvements have been made, notably the encapsulation of all transistor elements to overcome the instability problem and thus provide indefinite trouble-free operation of a high order of accuracy. The same method of construction has enabled the overall size of the unit to be reduced sufficiently for its incorporation in a standard time switch case.

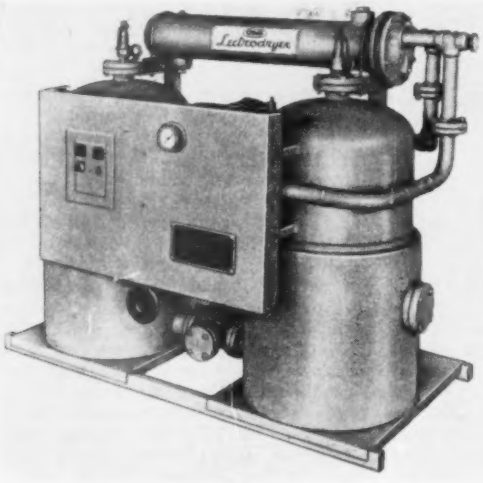
A solenoid is arranged to release the time switch contacts, to enable a 15 amp load to be handled. There is also a novel system of adjustment in the form of a calibrated tapping strip which allows the operating characteristics to be altered to suit the thermal characteristics of the building being served. The external temperature-sensitive element is now self-compensating and may be of any length as required by the building's construction. Repitrol controllers are marketed by *Heating Investments Ltd., 284 Regent's Pk Rd, N.3.*

Better and cheaper pumping

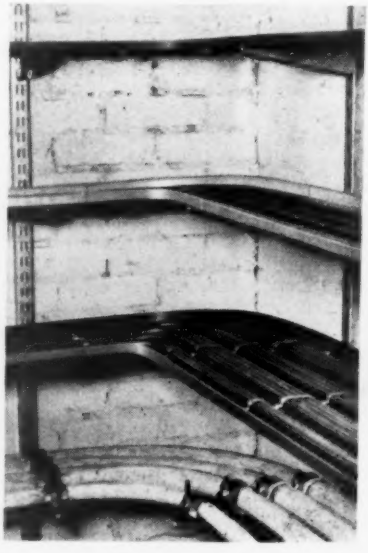
IN our description of the Sumo Short Four range of pumps in ELECTRICAL TIMES for 18 Feb., reference was made to a new ½ h.p. Clam Seal motor. This is an addition to the Clam Seal range available up to 55 h.p. *Stone-Chance Ltd., 28 St. James' Sq, S.W.11.*

Cutting cabling costs

SPEEDY erection, a cheaper installation and flexibility are the claims put forward for a cable racking system recently introduced. Cantilever brackets upon which cable trays can be fixed are held in vertical slotted channel strips. Cable racks are a development of the Spur adjustable shelf system. Brackets are available from 5 to 18 in. wide, suitable for loads up to 280 lb on the smaller size. Cables may be laid in trays or an attachment plate can be fitted to the brackets for mounting standard cable cleats. *Savage and Parsons Ltd., Watford, Herts.*



Twin chamber liquid or gas drying plant. Moisture adsorbent material in one chamber can be reactivated by heating while the other chamber is in use, thereby giving a continual flow of dry gas or liquid. The GWB-Lectrodryer is available with either manual or fully automatic control



Examples of the Spur cantilever arm supports for carrying cable trays and cleats. The cantilever arm is supported from a vertical slotted channel member

for the electrical trade

Mercury lamp reflectors

A NEW range of industrial reflectors for colour-corrected mercury lamps is now available. The "Ranmore," a reflector of the "Overlamp" through draught type is suitable for indoor or under-cover applications. It is of spun aluminium with an anodised reflecting surface instead of the usual vitreous enamel, and gives a light output ratio of 76%. The lampholder housing is an open die casting, which provides a certain amount of upward illumination, and incorporates a cool wiring box.

Reflectors are of the high bay type, with approximately 20° over all cut off. Maximum spacing height ratio is 1½ to 1. *Falk, Stadelmann and Co. Ltd., 91 Farringdon Rd, E.C.1.*

Shaver from M-R

MORPHY-RICHARDS have entered the electric shaver field with a high efficiency instrument which retails at £3 10s. It has dual voltage control, built-in on/off switch and an angled clipper bar for moustache and sideboard trimming.

Beard stubble is directed through perforations in the ·002 in. steel foil head on to vibrator blades cutting at 12,000 strokes a minutes. The shaver operates on 100/130 or 200/250 V a.c. with a loading of 11 W. It is 4 in. long; width is 2¼ in. and thickness 1⅛ in. Grey urea and black nylon form the body and head mouldings.

Included in the pack is a holder of grey polystyrene which may be mounted on the wall if desired or used as a case when travelling. A 5 A 2-pin plug is supplied with the shaver together with a bayonet adaptor for operation from a standard light fitting. A cleaning brush is also provided. Price breakdown is £2 19s 3d net list plus 10s 9d purchase tax. *Morphy-Richards Ltd., 50 Conduit St, W.1.*

The new shaver by Morphy-Richards costs £3 10s

TV relay cables

THE development of a new low attenuation television relay cable has been announced by Aerialite Ltd. The "Aeraxial" low radiation cable is particularly suitable for use where extended cable runs are needed.

Reduced radiation and attenuation is the result of efficient insulation. The conductor is enclosed in a five-cell core of extruded polythene within a sheath of extra close weave copper braid. Two further sheaths of tough PVC separated by a copper braid screen complete the cable. *Aerialite Ltd., Castle Works, Stalybridge, Cheshire.*

Air filtration unit

EXPERIENCE with filtration units for the atomic energy industry has enabled Vokes to produce an air contaminant removal unit for commercial use. The "Renovair" can clear a room of smoke, it is claimed, within a few minutes.

An integral fan, working from an electric motor, draws air on to a 5 in. deep filter panel. The panel, known as Vokes 44 "Absolute," has a paper element of cellulose and asbestos fibres which is pleated and cemented into a wooden case. The unit requires a single-phase 200/250 volt supply and may be mounted on either floor or wall. *The Vokes Group, Henley Park, Guildford, Surrey.*

TRADE PUBLICATIONS

HONEYWELL.—Booklet on thermostats and pressure controls. Honeywell Controls Ltd., Greenford.

PAXOLIN.—16-page descriptive brochure on electrical insulating tubes and cylinders from the Micanite and Insulators Co. Ltd., Blackhorse La, E.17.

PORTAWAY.—Folder and price list of earth continuity and bonding system accessories from Portaway Earthing Equipment Ltd., 2 North Park Rd, Harrogate, Yorks.

PRESTO.—Leaflet on portable electric spot welders for welding up to two 16 g. sheets from D.J. Equipment (Hersham) Ltd., 43 Queen's Rd, Hersham, Surrey.

ROLARAIL.—Descriptive folder and price list on light and heavy type conveyor rails from Thos. W. Ward Ltd., Albion Wks, Sheffield.

STANLEY.—Folder and eight-page descriptive brochure with price lists on Philips screwdrivers and screwdriver bits, from Home Sales Department, Stanley Works (G.B.) Ltd., Rutland Rd, Sheffield 3.

SWINDON.—Four-page technical data sheet on subminiature electrolytic capacitors 0·25 to 50 mfd, 1·5 to 30 volts working, from Swindon Condenser Co. Ltd., Industrial Estate, Swindon.

TITANIUM.—Six-page descriptive brochure on the uses of Titanium for jigs from Imperial Chemical Industries, Metals Div., P.O. Box 216, Birmingham 6.

Battery price reductions

THREE leading manufacturers of batteries have notified us of certain price reductions. The changes will become effective to the public on 7 March. Siemens Ediswan radio batteries, Exide "Drydex" and "Drymax," and Ever Ready "Batrymax," "Winner," "Portable" and "Alldry" will cost from 1d to 1s cheaper than previously. The new prices range from 1s 8d to 18s.

Mercury lamp prices

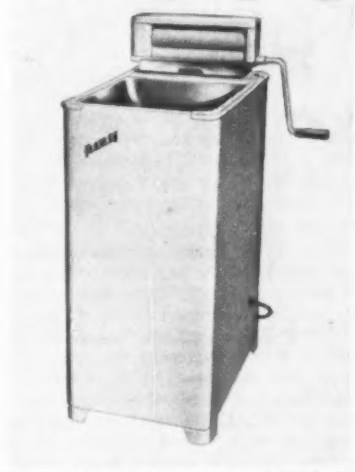
CROMPTON PARKINSON LTD., Aldwych, W.C.2, have announced price reductions for their MA/H and MA/V 250 and 400 W mercury discharge lamps. The 5s reductions were operative from 22 Feb., simultaneously with other manufacturers, whose similar price alterations were noted in our previous issue.

Low cost washer

AN electric washing machine to be introduced in March will be among the least expensive on the market. The "Flatley," costing only £12 19s 11d plus a hand wringer at £4 17s, has a working capacity of 8 gall and will handle up to 4 lb dry weight of clothing at one loading. Agitation of the water is provided by a plastic six-vaned pulsator set at the bottom of the chamber. The pulsator is offset toward the front of the machine and gives what is claimed to be excellent non-tangling performance. Power is provided by a ¼ h.p. motor on 230/240 V a.c.

Constructed of Vintex sheet, the machine will form a companion to the "Flatley" clothes dryer which is styled along similar lines. It has a white or cream stove enamel finish and stands 30 in. high. Width is 15¾ in. and depth 20¼ in.

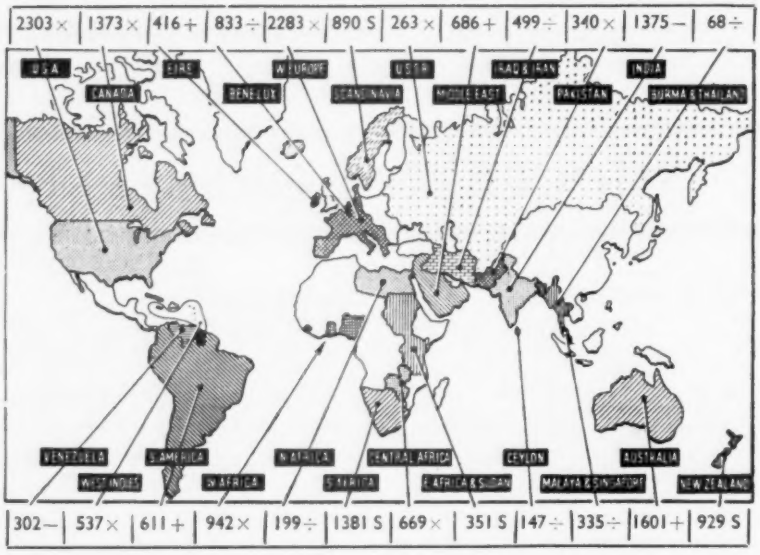
The handwringer has been specially developed for this application by Whittaker Bros. Ltd., and is fitted, as shown in the illustration, by a secure system of dowels and sleeves. It can be stored within the chamber when not in use. *A. J. Flatley Ltd., Kingston Mill, Corden St, Pendleton.*



The "Flatley" washer retails at £17 16s 11d with the wringer

Distribution of Exports in £'000's Sterling

× = over 25% increase
\+ = 10% to 25% increase
S = 10% + to 10% −
− = 10% to 25% decrease
÷ = over 25% decrease
on previous year's figures.



EXPORTS IMPORTS

January

ELECTRICAL exports last month were at a record level—a good augury for 1960—and it is to be hoped that the pace will be maintained. Many items contributed towards the large increase compared with the same month of 1959. On the heavy plant side, for instance, exports of generator parts reached a high figure and largely offset sharp reductions in other items. In the appliance sphere, vacuum cleaners showed a remarkable increase, exports of washing machines also being well up. It will be seen that clothes dryers of all types are listed separately for the first time along with parts of washing machines and dryers. Notable also is the high figure for cable exports, but this is largely due to the export of submarine telephone cable valued at £1,180,501 in the month. Even so, other cable exports showed welcome small rises. An additional item listed in the returns for the first time relates to industrial electronic control equipment, exports of which have more than doubled.

Imports of electrical products have also jumped, with the total topping the £4 million mark for the first time. Note that refrigerator imports alone were over £218,000 for the month, and those for lighting fittings increased by over 55%.

Our best customer for the month was the USA, but it must be remembered that the £2,203,000 total included the telephone cable order noted above. Other notable increases were marked up by Canada (£1,373,000 including £629,983 for generators and motors), and Russia.

Description	Exports Value (£)		Imports Value (£)	
	Jan. 1959	Jan. 1960	Jan. 1959	Jan. 1960
Generators				
Diesel up to 200 kW	399,979	480,971		
Diesel over 200 kW	236,849	157,855		
With i.c. or other prime movers	70,664	15,162		
Steam turbine driven	13,114	75,527	76,045	56,815
Water and gas turbines	241,123	593,491		
Generators up to 200 kW	138,401	124,947		
Generators over 200 kW	149,600	50,745		
Generator parts	675,849	1,081,983		
Motors, f.h.p.	178,942	285,232		
Motors 1-250 h.p.	422,869	459,726	103,671	142,786
Other motors	339,793	406,354		
Motor starters and controllers	323,066	269,533		
Convertors and rectifiers	103,786	72,061	93,962	112,582
Transformers	955,231	660,722		
Switchgear, to 200A, mv	406,129	440,644	85,231	160,209
Switchgear, other	1,291,917	1,194,264		
Total, Electrical Plant	*5,947,312*	*6,369,222*	*358,909*	*472,392*
Batteries, primary and parts	543,148	510,173		
Lamps filament, over 28 V	90,818	102,063		
Lamps filament, under 28 V	37,288	34,575		
Fluorescent and other lamps	115,824	82,716		
Radio and electronic gear	3,459,556	3,709,283	1,214,647	1,047,397
Telephone and telegraphic equipment	1,704,539	2,192,114		
Cookers	48,190	38,205		
Toasters	20,679	15,044		
Other cooking appliances and parts	103,781	153,858		
Space heaters	17,916	26,333	130,560	124,899
Water heaters	29,727	29,806		
Other heaters and parts	95,528	122,030		
Electric irons	72,958	95,157		
Vacuum cleaners	116,035	454,425		
Floor polishers	81,131	90,426		
Food mixers	58,390	45,551		
Washing machines, domestic	281,777	623,532		
Dryers		66,391		
Washing machine and dryer parts	93,150	115,226		
Domestic refrigerators and parts	670,090	615,910	90,361	218,482
Other appliances and parts	183,569	285,288		
Total, Domestic Appliances	*1,940,311*	*2,777,182*		
Portable power tools	207,458	241,319		
Arc welding plant	82,415	96,570	26,567	65,033
Resistance welding plant	14,623	23,317		
Electric furnaces	36,514	83,778		
Signalling apparatus	171,858	153,020	129,097	147,908
Commercial instruments	183,403	156,973		
House service meters	124,573	201,545		
Wiring accessories	180,219	203,835		
Fans	99,295	116,658		
Lighting fittings and lanterns	294,402	350,053	88,887	138,674
Other lighting equipment	97,239	80,049		
Telephone and telegraph cable	438,542	1,656,643		
Paper insulated cables	593,576	646,270		
Rubber insulated cables	297,335	278,900		
Thermoplastic insulated cables	185,645	324,958		
Winding and similar wires	116,395	146,276		
Other cables and wires	219,096	183,091		
Total, all cables and wires	*1,850,589*	*3,236,138*		
Accumulators and parts	366,871	285,878		
Insulating materials	149,558	247,840		
Electrical ware	125,754	130,425		
Industrial electronic control gear	67,390	158,791		
Permanent magnets	51,892	53,251		
All other articles	2,630,041	2,859,093	935,684	1,629,485
Total	20,553,685	24,155,861	2,974,712	4,116,270

News of the Week

LOW PRICED IMPORTED APPLIANCES

Warning for British manufacturers?

SPIN dryers for £9 each, 1½ cu ft absorption type refrigerators for 19 gn, rechargeable battery dry shavers for £2 16s, and vacuum cleaners for £4 6s —these are some of the extremely low net trade prices being quoted by the UK distributors of a well known brand of German appliances.

The prices are ex warehouse and do not include purchase tax, of course, the retailer being left to fix his own selling prices. But even with the addition of 25% p.t., and the retailer's normal profit percentage, the final prices to the public could still be considerably below those of most similar goods.

We are told that the reduced prices quoted above result from cost trimming with increased sales, and the appliances are currently on show at the *Daily Mail* Ideal Home Exhibition.

Although there is, as yet, no other indication of a price war developing, particularly in the imported appliance sphere, it could be a clear warning to British manufacturers.

Drayton-Southern Ltd. formed

A NEW company, Drayton-Southern Ltd., with an authorised capital of £100,000, has been formed jointly by Southern Instruments Ltd. and the Drayton Regulator and Instrument Co. Ltd. The function of Drayton-Southern will be to expand the instrumentation and control interests of the parent companies, using their research, production and sales resources.

Chairman of the new company is Col P. H. Lloyd, and the managing director is Mr J. G. Lubbock. Remaining members of the board will be drawn from the respective boards of Southern Instruments and Drayton Regulator and Instrument Co., who, it is emphasised, will continue to operate independently in their own fields.

British Batteries Overseas

WITH an eye on markets abroad, Joseph Lucas (Industries) Ltd. and Chloride Electrical Storage Ltd. have formed a new company named British Batteries Overseas Ltd., with an initial capital of £1,000.

First plans for the new company include the setting up of joint enterprises in Malaya and Ceylon with the Chloride company to manufacture batteries locally. Similar projects may be extended to other parts of the world.

E.M.I. Electronics link with U.S.A.

UNDER an agreement completed last week, the Fairbanks Whitney Corporation of USA, who manufacture a wide range of products from machine tools, diesel electric locos and electric power generators to aircraft engine accessories and missile components, will handle the marketing in North America of most of the range of electronic equipment designed and manufactured by EMI Electronics Ltd. In addition, Fairbanks Whitney will also manufacture some of the EMI equipment under licence.

Mr Clifford Metcalfe, managing director of EMI Electronics, told ELECTRICAL TIMES: "Certain equipment developed by the American company will be marketed in UK and Europe by us. We are also going to study the possibility of a joint venture in the electronics field in the European Common Market."

BID FOR BIRD

AN offer had been made by Gas Purification and Chemical Co. Ltd. to acquire the £250,000 capital of Sydney S. Bird and Sons Ltd., manufacturers of electrical equipment. Gas Purification are offering one 5s share for every two 4s Bird shares. A further statement is expected soon.

Harper Group Acquisitions

FOUR more companies have been acquired by Harper Engineering and Electronics against an issue for capital of new Harper 1s shares. They are:

Micalectric Ltd. (340,000 shares), manufacturers of mica for the electrical, electronic and oil industries.

J. and S. Newman Ltd. (110,000 shares), non-ferrous metal merchants and suppliers to aircraft, radio and TV firms.

C. D. Monninger Ltd. (195,000 shares), makers of engineering accessories for woodworking trade.

Mills and Brain Ltd. (10,000 shares), engineering consultants specialising in chemical industry.

Tangible assets of the four companies are estimated at nearly £200,000.

Hush-hush take-overs

Two more acquisitions have recently been announced. **Goblin (BVC) Ltd.** have just purchased an old-established company with a "respected trade name" which is to operate as a subsidiary—but its name cannot be revealed till next week.

Alwyn Holdings Ltd.—who already own Rashleigh Phipps and Co.—have acquired the share capital of a private company making electric light fittings and appliances, for £31,160 cash. But the name of the concern taken over is not disclosed.

Integration or Take-over?

IMMEDIATELY following notification of discussions between Simon Carves Ltd. and Henry Simon (Holdings)—both part of the Simon Engineering Group, came reports of a possible bid for the capital of Henry Simon. It has been stated that Electric and Musical Industries are making an offer for the shares.

Questions on Nationalised Industries

THE scope of Parliamentary questions on the nationalised industries was the subject of a statement by Mr R. A. Butler, Secretary of State, Home Office, in the House of Commons last week. The present position was that while Ministers could only answer for matters of broad policy affecting the nationalised industries, there was no hard and fast formula by which these matters could be identified and opened to questions in the House. In future, questions relating to Ministers' responsibilities for matters of general policy would receive sympathetic consideration.

Although no great extension of existing practice was envisaged, Ministers would try to interpret "general policy" in as broad a manner as possible.

There was a distinction between the GPO and other nationalised industries which were not directly controlled by the Government, Mr Butler pointed out. Discussions had recently taken place with a view to making answering policy more co-ordinated and equal between the various departments.

There was general opposition on both sides of the House to the idea of interfering with the nationalised industries, and the matter of answering policy, which had been the subject of recent inquiries by MPs, could not be taken further at present.

The dramatic effect of road warming is illustrated in this view of the Mound, Edinburgh, looking towards Princes St. The distinct line of the heated area where it adjoins an unheated road can be clearly seen. The clear roadway is heated for a distance of 60 ft to enable vehicles to grip the ice-free surface at the top of the hill. During a heavy snowstorm the road remained clear, while elsewhere the snow was 6 to 8 in. deep. Details of the installation were published in our 24 December issue

Electricity in the Countryside

EFFECTS of electricity supply lines and installations on the beauty of the countryside were debated again in the House of Lords last week; and the occasion was made more notable by the interventions of Lord Citrine and of Lord Hurcomb, once chairman of the Electricity Commissioners.

The debate ranged over familiar themes, but included a new emphasis on section 37 of the 1957 Electricity Act, which requires boards and the Electricity Council and the Minister of Power to "take into account" effect of their proposals on natural beauty and the like. Lord Birkett suggested that there was "defiance" of section 37, and another speaker asked about the possibility of legal action to enforce more attention to it.

There were signs of doubt about the appropriateness of a Ministry of Power inspector conducting public inquiries where amenity was involved, although there were many tributes to the inspector as an engineer. The idea was advanced that in some cases, an independent chairman could well be appointed for such inquiries.

Lord Citrine, in his speech, contended that the boards had always paid much attention to amenity considerations. He pointed out that no less than 26% of the total area of the country has been designated or recommended either as national parks or as areas of particular beauty. That made it difficult to find other routes for lines. Lord Citrine spoke of suggestions that the supply industry had a large surplus it could spend on such amenity-favourable steps as undergrounding of overhead lines.

After emphasising that pace of electrical development was sensitive to price, he went on "if the amenity societies have got their eyes on that surplus, do not forget that the trade unions have got their eyes on it also."

Government spokesmen in the debate had little to add to what has been said on this subject already. They did, however, report that out of 7,000 applications for electricity planning permission received every year, only 20 to 30 become subject to objections and about a quarter of these objections have been upheld by the Minister during the past few years.

Plant Conference

THE 1960 annual conference of the Institution of Plant Engineers will be held at the Grand Hotel, Scarborough, from 4 to 6 May. Two papers will be presented, namely, Developments and Problems in Welding (by Dr R. Weck, director of research, British Welding Research Assn.); and People—the Most Important Factor in Industry (by Mr F. S. Walker, chairman, Lever Bros (Port Sunlight) Ltd).

In addition there will be group discussions on the following papers: Training and Education of Supervisory Staff (by J. Wilson, director of education and training, British Motor Corporation); Developments in Materials of Construction (by K. S. London, works manager, Associated Ethyl Co. Ltd.); Engineer's Function in Industrial Safety (by J. MacColl, HM Deputy Chief Inspector of Factories).

The association is inviting a member of principal non-member industrial firms to nominate senior staff to attend.

New Foundry Equipment Company formed

A NEW company, named Foundry and Metallurgical Equipment Co. Ltd., has been formed jointly by EFCO Ltd. and Stein and Atkinson Ltd. The company will design, manufacture and supply an extensive range of foundry equipment including melting furnaces, annealing furnaces and ovens, blowers, driers and die-casting equipment. In addition, they will also make, under licence, the EFCO-Diamond rotary reactor for desulphurising iron and steel.

Arrangements have been completed with Sinex Engineering Co. Ltd. and with Aldridge Industrial Oils, USA, for the sale of their products in the UK. Directors of the new company are: D. F. Campbell (chairman), C. J. S. Atkinson, J. A. Monks, and C. H. Williams. Consulting metallurgist is A. G. Robiette. The company is based at 161 Queens Rd, Weybridge, Surrey.

STAFFING DOUNREAY

THE number of scientists and engineers engaged in work on the Dounreay fast breeder reactor has more than doubled since 1958, the Minister of Education, representing the Minister for Science, said in answer to a question in the House of Commons last week. Plutonium in large quantities would not be required for the experimental programme at Dounreay until about 1963-64, but in the meantime adequate quantities were being made available for research on the development of fast breeder reactors.

The Minister said that a total of 4,223 scientists and engineers were employed by the UKAEA throughout the country. Of these, 505 were electrical engineers.

£6 million M.E. order for the U.K.

A BRITISH consortium has secured a £6 million contract to build a complete textile mill in the Sudan. The companies concerned are English Electric, Platt Bros. (Sales) and Marples Ridgway and Partners. The mill, due to start operation in 1961 with 3,000 employees, is being financed by the UK and the US.

English Electric are to supply the diesel generating plant and all equipment for the distribution and use of the power. Five diesel alternator sets are required, each having an output of 1,480 kW at 415 V three-phase 50 cycles. In addition, the company will supply a main switchboard and more than 2,500 electric motors, ranging from 1 h.p. to 15 h.p.

More than 600 specially designed Atlas recessed trofter lighting fittings have been installed in the new offices of the Gulf Eastern Co., Gulf Hse, W.1. In the offices, 4 ft 40 W fittings were used, the switching being arranged so that either two or four tubes could be used, giving a choice of illumination level. This type of fitting was selected as it gives easy access from below, and the trims could be conveniently integrated with the suspended ceiling. Picture shows the fittings installed in one of the offices

Tercentenary of The Royal Society

FORTY-SEVEN countries will be represented at the tercentenary celebrations of The Royal Society from 18 to 26 July. The programme planned will give a broad view of current progress in science, as well as past history, especially in fields where British contributions have been important.

The formal opening ceremony will be at the Albert Hall on 19 July, followed by the president's address. Ten tercentenary lectures have been arranged covering a wide range of subjects, including nuclear power plant design (Sir Christopher Hinton), radio astronomy (Prof A. C. B. Lovell), and trends in aeronautical science and engineering (Sir Arnold Hall). There will also be visits to laboratories and research centres.

The society is the oldest scientific society in any country which has existed continuously since its foundation. It was formed in 1660, and approved by Charles II.

Dragon Reactor Budget Approved

THE 1960-1 programme and budget for the OEEC high temperature reactor project (Dragon) was last week approved by the board of management under the chairmanship of Dr Sigvard Eklund, of Sweden, at the UKAEA h.q. in London. Proposed expenditure totals £2,830,000, about one fifth of the £13,600,000 estimated for the five-year period concerned.

The sum includes £950,000 for the reactor plant and buildings, £910,000 for extra-mural research and development, and £970,000 for the maintenance and work of the project staff at Winfrith.

The board also approved proposals for collaboration between the Dragon project and the US Atomic Energy Commission, under which information will be exchanged on the progress of the project and a similar reactor scheme under construction in the USA.

New executive appointments include: R. K. Andersen (Norway) as head of administration, Gianfranco Franco (Euratom) as chief engineer, and S. B. Hosegood (UK) and R. Tron (Euratom) as deputy chief engineers. Dr Eklund and Sir William Penney continue as chairman and vice-chairman, respectively.

Immersion Heater Peace

BEESTON and Stapleford Urban Council have rescinded their decision that only their own electricians can install immersion heaters in council houses (as reported in our 28 Jan. issue). On a recommendation of the Housing Committee, the Council have now decided that tenants requiring the installation of immersion heaters or other electrical appliances, can choose their own contractor, the only stipulation being that contractors must be registered with the National Inspection Council.

Commenting on this move, a spokesman of the Nottingham Chamber of Commerce said: "I am very pleased to hear this. It would have been a very retrograde step had this decision not been taken."

Beryllium for the A.G.R. Project

SELECTION of beryllium as the major canning material for the advanced gas-cooled reactor marks the first commercial application of the fabricated metal in the UK. Four firms are now actively engaged in the production and fabrication of the metal on an industrial scale, and facilities for the development of fabrication techniques and for testing beryllium are available at three UKAEA establishments. A fourth facility, to be used for the production of fuel elements, is being commissioned at present.

The ultimate aim of all beryllium work proceeding within the development and engineering and production groups and at AERE, Harwell, is the production of fuel elements which will retain their integrity over an economic life. This requires a compromise between three interdependent variables, namely, design, mechanical properties and corrosion properties referred to the service conditions of the various components in the reactor. The effect of irradiation on these properties is of primary importance.

The UKAEA effort is devoted to a wide range of problems, both practical and theoretical, including:

(i) Examination and assessment of a wide range of production, fabrication and welding techniques.

(ii) Development and assessment of new methods of fabrication including arc melting, electron beam melting and new sintering methods.

(iii) Further development of specific processes such as the extrusion of fine bore tubing to close dimensional tolerances.

(iv) Theoretical and practical evaluation of the effects of irradiation on the physical, chemical, mechanical and metallurgical characteristics of the metal.

(v) Studies of the effect of impurity elements on the properties coupled with the development of new techniques aimed at the production of ultra-pure metal.

(vi) Theoretical and practical studies of the mechanism of deformation of the metal and of the structure, particularly the preferred orientation of the deformed metal. This has necessarily included heat treatment studies, aimed at improving our understanding of the brittle nature of the metal and ultimately to increase the creep ductility.

Pay-off at Larne

TWENTY-FOUR employees were last week paid off AEI's turbine factory at Larne, Northern Ireland, and a further 15 workers left of their own accord. Of the 24 men, mostly welders, 19 are members of AEU.

Last month the management announced that 100 men would become redundant, and since that time, 70 men have found employment elsewhere. Of the original 100 who were to have been dismissed, 85 were members of AEU.

"The fact that we reduced the figure to 19, speaks strongly for the co-operation between the union and the management," an AEU official said. At present some 90 men are working short time—five weeks on and one week off. A ban on overtime is in force at the factory.

OFFICIAL PUBLICATIONS

BS 1497. Impregnated Asbestos-covered Copper Conductors. Part 3. Round wire: metric units. 4s 6d.

BS 3188. Enamelled Copper Conductors. Part 1. Round wire. 7s 6d.

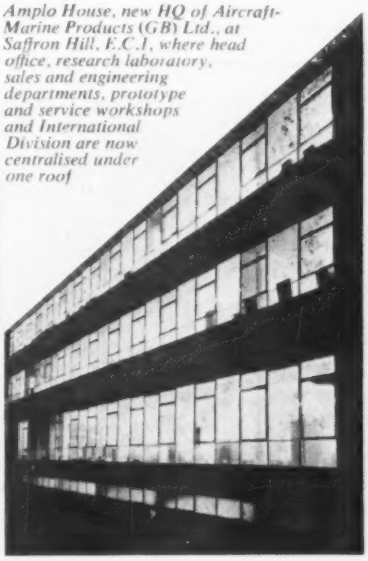
BS 3205. Photographic Electronic Flash Equipment. 4s 6d.

BS 3207. Mineral-insulated Cables. Part 1. Copper-sheathed Cables with Copper Conductors. 5s.

Human Problems of Innovation. No. 5. DSIR Report. HMSO. 2s 6d.

275 kV Severn Crossing filmed

HAIR-RAISING shots of linesmen, tight-wire walking at 400 ft above ground, spiced a colour film describing erection of the 275 kV towers and lines across the Severn. Although announced as an amateur production, colour, sound and editing were of high quality, and showed clearly some of the difficulties encountered during erection of the line and techniques used. The film was shown at a reception given by the line constructors, J. L. Eve Construction Co. Ltd.



Amplo House, new HQ of Aircraft-Marine Products (GB) Ltd., at Saffron Hill, E.C.1, where head office, research laboratory, sales and engineering departments, prototype and service workshops and International Division are now centralised under one roof

I.E.S. meeting to have "new look"

TOO often, annual conferences of technical and similar bodies are used as an excuse for a holiday. To ensure that their biennial summer meeting does not fall into the same situation, the Illuminating Engineering Society have planned something new for this forthcoming event, to take place in Harrogate from 15 to 18 May. As indicated in the brief report in our 18 February issue, formal technical papers have been cut down to three, spread over 1½ days, and at a Press conference last week, we were able to hear something of the Society's plans for the remaining day.

Delegates will be split into study groups devoted to discussing subjects of particular topical interest in a close and informal way, with the aim of encouraging the "back-bencher" to participate more fully in the work of the meeting, with beneficial results both for himself and other delegates.

There are to be six study topics, three being dealt with in the morning of the second day and three in the afternoon. The study groups will last about two hours, being then followed by a general session at which the chairman of each will make a brief report.

It is anticipated that about 200 delegates will be attending the conference, so that each group will comprise from 60 to 70, which should not be too large for useful discussion of the informal character envisaged.

For the morning session, topics for study are: task analysis; luminance and glare; modelling and colour. Although biassed towards the "academic," such subjects are assuming greater practical importance for lighting and works engineers and for architects. It is becoming essential, not merely to determine the components of any individual visual task, but also to assess the visual performance of those performing the task.

It is also becoming necessary to formulate a more positive approach to the assessment of glare in quantitative terms; although glare is recognised as an undesirable element, it is virtually impossible at present to measure how much is present in a given situation.

The afternoon topics are: industrial area floodlighting, maintenance lighting calculations. These have been chosen as being of practical interest to those concerned with lighting, and it is hoped that discussions will throw up ways of relating users' experience of these problems with their theoretical prediction on paper. To this end, the IES are hoping to attract not merely members of the Society but also engineers and others who deal sufficiently with lighting matters in their work to make a useful contribution to the meeting.

Another feature of the meeting is the switch-on of floodlighting of Fountains Abbey. This is a new installation specially arranged by the Society and provided as a co-operative venture by its sustaining members. Visitors can expect to see considerable use made of latest techniques in this field of public lighting, to make up, to some extent, for the neglect of floodlighting in this country since the war and to stimulate interest in it.

E.T.U. to explain

AS anticipated, the TUC General Council last week decided to invoke Rule 13 and to summon representatives of the Electrical Trades' Union to answer allegations of electoral ballot-rigging.

The Council expressed its "grave concern at the continuing accusations made publicly about the ways in which the affairs of the ETU are conducted." The union's representatives have been asked to meet the TUC Finance and General Purposes Committee on 14 March.

M.E.B. District Amalgamation

NEXT month the Midlands Electricity Board is to combine its Smethwick district with its West Bromwich district to form a new enlarged administrative district embracing West Bromwich, Smethwick and Oldbury, Mr H. T. Timberlake will be manager of the new district, Mr G. Fisher, now manager of the present Smethwick district, retiring, as we note on page 347.

£140,000 power project in Cornwall

A POWER improvement and reinforcement project in East Cornwall has just been completed at a cost of £140,000, Mr F. C. Isaac, the SWEB district manager, announced last week. A new bulk supply point at St. Germans (near Bethany) transforms the 132 kV supply to 33 kV for distribution to substations at Callington and Liskeard. Next year additional h.v. lines are to be extended to Looe and Torpoint to reinforce the system there.

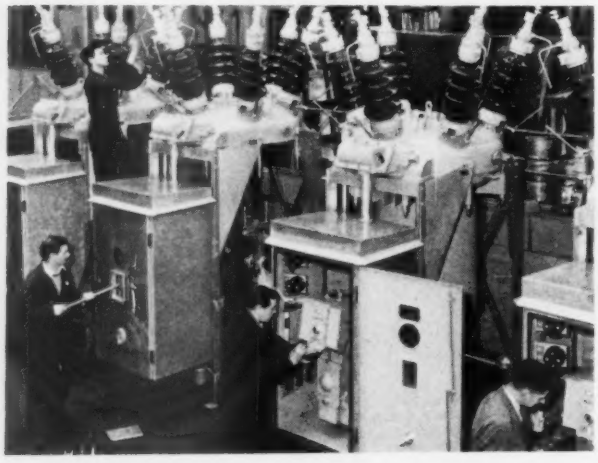
The bulk supply point is unmanned, but is controlled from Fraddon. The board's switching room at St. Germans is claimed to be the most up to date of its kind in the west country, and has electric floor-warming. Automatic equipment records the loading every half hour. Output of the substation is 45 MW to an area containing more than 20,200 consumers.

S. Scotland Board increases Tariffs

INCREASES in tariffs, of about 6%, operative from 1 April, are announced by the South of Scoland Electricity Board. These apply to the domestic, farm, catering and general block tariffs. Public lighting charges are also being raised from 15 May. In the domestic tariff the primary rate for the first 15 units per room is raised by ½d to 6d; a new secondary rate of 1½d p.u. for the next 15 units per room is introduced, but additional units remain at 1d. For farms the primary rate also becomes 6d, with secondary units increased to 900 chargeable at 2d instead of 1½d. Similar charges apply in the general block tariff, while for caterers the present flat rate of 1½d is increased to 1¾d.

For public lighting the primary rate becomes 2¾d for first 1,200 hours, additional use remaining at 0·9d. The m.d. tariff is under review, the aim being to take into account the trend towards higher fixed charges and lower running costs, and it is likely that off-peak tariffs will be reduced.

These revisions are necessary because of the Board's heavy programme of capital development and consequent increased interest and depreciation charges.



The first four of 35 outdoor oil circuit-breakers get a final check at English Electric's Stafford Works before being shipped to the Los Angeles Dept. of Water and Power. The 34·5 kV single tank breakers have a current rating of 1,200 A and a breaking capacity of 1,000 MVA

Department for Semiconductors

A NEW Product Department devoted to semiconductors has been set up by AEI in their Radio and Electronic Components Division. The department's sales organisation is at 155 Charing Cross Rd, W.C.2, and the sales manager is Mr F Szekely.

Ergonomics for Nuclear Control

IDEAS on how to match design of nuclear power station control rooms to the characteristics of staff who will man them have been drawn up for GEC by a three-man team of American consultants. The team are associated with the US consulting firm of Dunlap and Associates, and were headed by an industrial psychologist. The purpose of their discussions with GEC was examination of the proposed design for the Sizewell nuclear power station, from the aspect of "human engineering" (or "ergonomics," to give it the formal name).

Against the background of this particular station design, the US team has made general recommendations which may be taken into account in future designs. First step of the team towards evolving suggestions was to consider tasks of control room staff. It is argued that there are two functions. The first is to supervise or take over from automatic devices to control the reactor in an emergency which may lead to an unsafe operating condition.

Second function of control engineer is to help make the system operate more effectively. This he may do in two ways: by taking action that will prevent situations from developing, and by trimming the control system, etc., to give maximum power output without reducing life of reactor components. The enemy of these tasks is boredom; it is unlikely that the control staff will ever have to take emergency actions.

Recommendations made by the team so far as the Sizewell design is concerned, include improvements in layout of instrument panels and controls along well established lines; for instance, making use of the ability of humans to recognise patterns easily and, hence, departures from patterns.

Also, it has been suggested that control staff should not continuously carry out the same job. A man might spend one week in the reactor control, one week of steam raising unit control and another on turbine house control. Avoidance of solitude and such matters as seat design have also been covered.

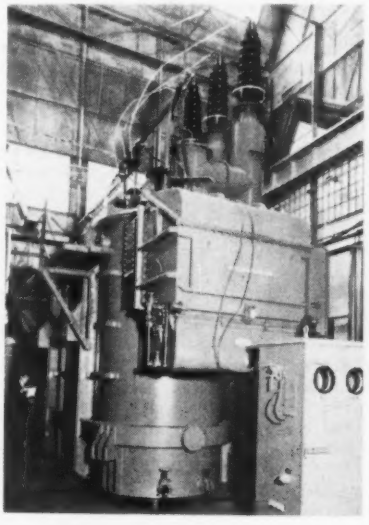
In the longer term—"blue sky recommendations" in the American jargon—the proposals include keeping the size of the control room small rather than cathedral-like, so that staff can feel they impose themselves on their surroundings rather than the other way round.

Another suggestion is for provision of a digital computer for the staff to use. Three functions are seen for this computer: to assist station physicists in efficiency calculations; for use a simulator in training staff (the point being that staff training is needed for an emergency that will seldom, if ever, happen, so staff need to be constantly retrained to ensure that they will react in the desirable manner if an emergency ever does arise); and, finally, for use as a prediction of what will happen when a certain control function is applied.

It is considered that control engineers in such a nuclear station control room should not be a career job; interest of staff should be held by regarding the job as a training appointment for several years on the way to more important positions.

Loch Awe Scheme Progress

TENDERS for the main plant for the Cruachan power station of the N of S H-E Board's Loch Awe scheme in Argyll are to be invited. This section of the scheme comprises a pumped storage development with 400,000 kW of combined pumping and generating plant. Surplus generating capacity will be used to pump water into a storage reservoir 1,200 ft above Loch Awe for subsequent use in generating electricity to meet high demand.



The first of two 128 MVA generator transformers manufactured by Hackbridge and Hewittic for the CEGB's Belvedere power station was delivered last weekend. The transformer has a voltage ratio of 13·8/140·5 kV with tappings at ±10% in 1·43% steps controlled by resistor type on-load tap-changing gear. The core is of cold rolled steel and cooling is by means of two separate water coolers

1959 Production gain

PRODUCTION of electrical and engineering goods, after showing no gain in 1958, increased rapidly in 1959 and by the third quarter was 9% up on the year before. The rise was due initially to increased demand for consumer goods, and was later sustained by gains in deliveries of capital goods, according to Treasury statistics.

Sir Willis Jackson, the president, speaking at the IEE annual dinner (reported on page 332). On his right is Sir George Thomson

Steel mill order for A.E.I.

A £1·8 million order for the main drives and auxiliaries for what is claimed to be the most powerful hot strip roughing mill in the world, and for the fastest four-stand tandem cold sheet mill in the UK, has been received by AEI. Both mills are being built at the new Richard Thomas and Baldwins Spencer Works, Llanwern.

The equipment includes five d.c. edger motors and seven synchronous motors with a total output of 45,000 h.p. for the roughing mill, and six 3,000 h.p. d.c. motors, two 2,000 h.p. motors, and one 1,400 h.p. motor for the cold sheet mill.

OFFICES BILL SUPPORTED

THE Government will support the Offices Bill (a private member's measure which they opposed at its first reading) and will do everything possible to make it a workable proposition, Mr Dennis Vosper, Joint Under-Secretary of State, Home Office, said last week when a Standing Committee of the House of Commons considered the Bill for the first time.

Amendments would be introduced to make the Bill as effective as possible, at least on a temporary basis, he pointed out. The Bill differed so much from other Acts dealing with conditions of work places that it would be desirable, given time, for the Government to replace it with a more comprehensive statute on the lines of similar existing Acts.

The purpose of the Bill is to provide statutory minimum standards of conditions of employment for those who work in offices, including provisions for ensuring adequate lighting, heating and ventilation, and the regular inspection and maintenance of electrical equipment. "One difficulty is that there has never been a definition of 'office'," Mr Vosper said.

Among the amendments agreed to were provisions requiring the Secretary of State, before making regulations under the Act, to consult organisations representing the interests concerned; also, such regulations had to be approved by a resolution of each House of Parliament.

Protest changes N.W.E.B. power policy

A CHANGE of plan in NWEB's rural electrification policy in Cumberland follows a strong protest by the area consultative committee. The dispute concerned the order of priority in which power supplies should be connected in the Lake District.

Members of the committee had recommended that the area with the strongest claim in the north east section of the area was the Solway Coast, but the board, rejecting this advice, decided to extend the supply to the Arthuret area instead.

The council passed a resolution expressing "profound dissatisfaction" at the board's decision, and referred the matter to the Electricity Council. The board has now decided to proceed with the electrification of both areas at the same time.

Noise Abatement Bill

A BILL has been introduced in the House of Commons by a private member to make new provisions for the control of noise. It proposes that excessive or unnecessary noise which is a nuisance or annoyance or is prejudicial to health shall be a statutory nuisance; but that it shall be a defence where a trade process is concerned to show that the "best possible means of preventing or mitigating the noise" is being used, having regard to cost and other factors.

£¼ million "thank you"

AS a token of thanks to their employees for their part in helping to achieve a record trading profit for last year of over £11 million, Hoover are to distribute £250,000 among employees. The bonus will be divided among the staff on the basis of age and service.

Sayings OF THE WEEK

"If the amenity societies have got their eyes on that surplus, do not forget that the trade unions have got their eyes on it also." . . . LORD CITRINE, in House of Lords debate on electricity development.

"It is said that the really up-to-date research student makes electronics write his thesis. I do not believe this: I am convinced that any self-respecting electronic device would write much better English." . . . SIR GEORGE THOMSON, at the IEE dinner.

"The Government must be aware that trade unions are bound to take account of price movements in framing wage applications, continue to exercise pressure on manufacturers and others to reduce prices" . . . in the TUC General Council's statement to the Chancellor of the Exchequer.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, March 1

	£ per ton	Weekly change £
COPPER, standard class A (settlement) ...	252½	+1½
,, (3 months)	239½	+4
LEAD, refined pig, 99·97% purity (cash)	75	−½
,, (3 months)	74½	−¾
TIN, refined, min. 99·75% purity (settlement)	790	−3
(3 months)	790	−1½
ALUMINIUM, ingots 99·99·5% ...	186	—
wire bars (4×4×54")	209	—
BRASS Strip 63/37	221½	+3½
SILVER (Troy oz)	79½d	—
ZINC, virgin, min. 98% purity (cash)	87½	−¾
,, (3 months)	87½	−¾
RUBBER, per lb.		
No. 1, R.S.S. spot	34½d	+⅛d
c.i.f. basis, ports, May	33½d	—
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	66½	—
Mild Steel Tape (0·04 × 1½ in.)	53*	—
NICKEL (home)	600	—
MERCURY (76 lb flask)	70½	−½
AMERICAN PRICES:		
Copper, electrolytic (per lb) ...	35c	—
Lead (New York)	12c	—

* *Tape Price, now an average, includes varnishing*

Industry's Training Responsibility

RESPONSIBILITY for training in industry has been accepted as resting with industry, the Minister of Labour stated in the House of Commons last week. Industry had set up the Industrial Training Council with the object of increasing the numbers being trained, and at the moment the figures were keeping pace with the increase in the school-leaving population.

Mr Heath was answering questions on the problem of employing the "bulge." The number of school leavers next year would be about 22% higher than this year, in 1962 32% higher, and in 1963 17% higher, and it was suggested that the Government should produce plans to supplement the voluntary efforts of private industry.

During 1959, 119,332 boys and girls became apprentices or learners, the Minister said, compared with 110,564 in 1958. Both figures were roughly 21% of the number of school leavers entering employment. He thought that the proportion of apprentices and learners would increase in view of the expanding industrial economy.

Part-time Education Figures

FIGURES showing the proportion of boys and girls under 18 years of age released by their employers to attend courses for part-time education in various industries were given in a written answer to a Parliamentary question last week.

England and Wales: In the year 1957-58, the number of students released in engineering, shipbuilding and electrical goods industries totalled 3,781, or 10·9% of the estimated number of employed. In the electricity, gas and water supply industries, the figure was 24·9%. Highest proportion of releases was in public administration and defence (73·3%), and the lowest in wood and cork manufacturing (0·7%). Average for all trades and industries was 8·7%.

Scotland: In the same year, 6,237 students were released in the engineering and metal industries, or 25% of the total employed. In the building and contracting industries the figure was 26%. Highest was 62% in public administration and local authority services, and the lowest 1% for insurance and banking. The average for all trades and industries was 11%.

Haslett Trust Award

THE first award to be made by the general section of the Caroline Haslett Memorial Trust will be an exhibition to enable a woman engineer to visit the USSR for the purpose of studying the training, employment and prospects of Soviet women engineers. The exhibition will take place in early autumn, and women engineers in the UK are invited to apply to the secretary of the Trust, 25 Foubert's Pl, W.1.

News in Brief

Arrangements have been changed for Miss Kay Pennett to give her Caroline Haslett Trust lecture at the Housecraft Advisers' Conference. It will now be given on 21 March at 6 p.m.

Marconi's Wireless Telegraph Co. Ltd. have completed an experimental installation of closed circuit television at London Airport to enable the authorities to determine whether the control of aircraft parking can be improved.

A ten-storey block of all-electric flats with floor-warming was opened at Leeds last week.

Manchester electrical wholesalers, F. Hulme and G. Ellam and Co. Ltd., in conjunction with Dexion Ltd., recently held a film show and exhibition of Dexion products in the Lancashire County Cricket Pavilion.

"Bruno-Cape SA" is the name of a company formed by The Cape Asbestos Co. Ltd. in conjunction with Bruno y Cia Com E Ind SRL, of Buenos Aires, the oldest and largest general asbestos manufacturer and merchant in Argentina and with the Johns-Manville International Corporation of USA.

Company Activities

ANOTHER warning shot was fired off last week by the Government in its concern to see the boom take in some of its still billowing sail. The withdrawal of Bank of England support as an absorber of gilt-edged sales by the banks told them in plain money market English that some restraint must now be exercised on advances to customers. By selling off their gilts—the mid-February banks' statements showed that they had realised £77 million worth of stock in a month—the big nine banks had, more or less, maintained their traditional ratios by lending an extra £86 million in January, in advance, so that total overdrafts are now in excess of £3,000 million. By holding off the market, the Bank of England indicated that it was no longer prepared to support this rising trend of debt, with all its inflationary threat, to an unlimited extent. Consequently, gilt-edged prices slumped and in some measure took equities along with them in the slipstream. But there was no panic. Despite the feeling on the part of many stock market operators that equity prices are still "toppy" they continue to display a healthy resilience and the signs of recovery were soon in evidence after only the smallest of setbacks.

Back in August, Hoover's 5s "A" Ordinary shares, after their eyebrow raising half-time results, looked high enough at 73s. So what happens? They had risen to 109s 6d before last week's results, dipped to 105s on the results and then recovered to 110s 6d by the end of the week. An increase in net profits after tax from £2·41 million to £5·49 million (+128%) was achieved on a 50% increase in turnover and a series of price cuts. We may toy with the idea that at this rate Hoover's entire 1958 production could have been given away as free samples and still a substantial profit made! Let's have more price cuts, anyway. On top of these fantastic profits came a step up in the dividend from 60% to 90% plus a one-for-one free scrip issue in "A" Ordinary shares. Earnings for the ordinary capital now work out at 362·6% so that cover for the bigger dividend is now four times against 2·5 previously, while the dividend yield has risen from 2·8% before the result of 4%.

Morphy-Richards, another old favourite of mine, has also been doing its stuff. Just about this time last year I pointed out the attractions of their 4s Ordinary shares at 19s. Last week they were up to 40s 9d before the announcement that a one-for-one free scrip issue is proposed and that the 8% interim dividend will be paid on the doubled capital against 10% last year, an effective increase of 3%. "Buy on a split" is an old City axiom. At 40s 2d, my advice would be to do just that.

Elsewhere in the electrical market EMI on the increased interim dividend as forecast coupled with details of the EMI—Fairbanks agreement which aims at boosting the sales of British designed electronic equipment in the US put the 10s ordinary shares 6s 10½d higher to 58s. Renewed American buying was also a supporting factor here. Philip lamps at 150s have also been in strong demand as were Birmingham Sound Reproducers, Plessey and Marconi Marine.—*From our City Correspondent.*

Allied Insulators Ltd.

A final dividend of 15% makes the total 20% as forecast. Consolidated profit is £579,107, before tax. The figures include results of Bullers Ltd. for 17 months and for Taylor Tunnicliff (Electrical Industries) for 12 months.

Bylock Electric Ltd.

With increased profits, a rights issue of 540,000 "A" 1s Ordinary at 3s each on a one-for-five basis, is announced. After taxation, group net profit for year to 31 July last is £80,133 (*£56,313*). Dividend is again 33⅓%.

Clarke, Chapman and Co.

For 1959, the profit is slightly down at £353,061 (*£371,775*) after all charges, including taxation. Dividend is again 13¼%.

English Electric Co.

The volume of the group's business has doubled since 1953, and continues to expand, the chairman, Lord Nelson of Stafford, tells shareholders. From the world-wide recession of two years ago, there has been a revival of activity over the past 18 months, but he warns that the expansion of total demand so far has been largely on durable consumer goods. In heavy electrical products, there is acute competition, and the resurgance of manufacturing activity in western Europe and Japan has brought a state of over-capacity in relation to world demand. Export orders are secured only at prices so disappointingly low as to fail to provide adequate margins which are essential to cover large scale expenditure on research and development. Orders booked during 1959 were £14 million higher than for 1958, but profit margins are low. Steam and hydraulic turbines continue to be one of the most important of the company's activities, while on the traction side a considerable volume of business is expected over the next three or four years from the British Railways' programme. In domestic appliances, a smaller refrigerator is being introduced this year along with a new fully automatic drying machine, and other projects are under development.

Hoover Ltd.

In addition to almost doubling of group profits for 1959, an increase in capital is announced. Group profit is £11,135,225 (*£5,847,490*), and the total distribution is raised from 60% to 90%, with a final of 80% (*50%*). It is proposed to capitalise £2,450,000 of reserves in the issue of 9,800,000 "A" Ordinary 5s shares to "A" Ordinary holders on a one-for-one basis. Net profit for 1959 is over £3 million up at £5,485,662 after UK taxation of £5,208,460. The increased figures resulted from a 50% increase in turnover, with export sales being extremely good, Mr Sidney Roberts, managing director, has stated.

International Combustion (Holdings)

A decline in trading profits must be expected over the next two or three years, Sir James Reid Young, the chairman warns shareholders. There has been a sharp reduction in the orders available, and with productive capacity greatly in excess of current demand, there are reduced margins on business secured. Value of orders received in the year to 30 Sept. last, was below the previous year's exceptional total, but above those received in 1956-57.

Lancashire Dynamo Holdings

Over 96% of the Ordinary and 94½% of the 5½% Cumulative Preference stock had been acquired by Metal Industries Ltd. up to the end of the extended closing date, 19 Feb. The remaining stock is being acquired compulsorily. A meeting is called for today, 3 March, to deal with the special resolutions. To dispel any misapprehension, the MI board point out that the total cost of LD shares purchased on the market was rather less than the same shares would have cost if acquired on the basis of their offer.

Midland Electric Mfg. Co.

For 1959 the group trading profit is only slightly up at £495,362 (*£487,152*), and after taxation the net profit is £264,645 (*£246,800*). Dividend is raised 2% to 12%, with a final of 8%.

Morphy-Richards Ltd.

Along with an interim of 8% (*same*) on the increased capital in respect of the year to 30 June next, the directors recommend the capitalisation of £847,192 of reserves in the issue of 4,235,961 Ordinary 4s stock units. The latter comprise a one-for-one issue.

Rheostatic Co. Ltd.

Consolidated profit for the year to 30 Sept. last is £386,796 (*£288,411*) after charging depreciation at £92,041 (*£87,849*) and directors' emoluments £30,892 (*£24,495*). Final dividend is 14% making 20% as forecast, against 12½% for the previous year. Net profit after tax is £204,812 (*£134,054*).

Intended Dividend

Electric and Musical Industries. Interim 5%.

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

4 March—Belfast T.C. (b) Supply of sodium floodlighting lanterns, brackets, steel standards and flashing beacon equipment (Spec. W.172); and (c) (Spec. W.173) a.c. motors and wiring to replace existing d.c. installations.—See 25 Feb. issue.

4 March—Bournemouth T.C. Supply of 650 c.i. Group "B" columns, swan-neck brackets and lanterns. Borough Engineer, Town Hall, Bournemouth.

4 March—Bristol T.C. Improvements to electrical installations in pre-war council dwellings.—See 25 Feb. issue.

4 March—Durham R.D.C. Supply of electrical goods for council house maintenance. —See 25 Feb. issue.

4 March—Notts C.C. Supply and erection of columns, lanterns and switchgear on traffic island on A614.—Advertised 21 Jan. issue.

4 March—South Down. (10) Hospital building maintenance and electrical repairs for year.—See 25 Feb. issue.

4 March—Stoke-on-Trent T.C. Electrical installation in Home for the Aged and Infirm, Consett Rd, Blurton, by contractors on N.I.C.E.I.C. roll, etc. Applications to City Architect, Kingsway, Stoke-on-Trent, by above date. Deposit £2 in notes.

4 March—Wilts C.C. (C) Installation of electrical system at 15,850 sq ft Devizes Southbroom Controlled new Primary School.—See 25 Feb. issue.

5 March—N. Riding C.C. Supply of lamps for year from 1 April, 1960, to homes for the aged and children's homes.—See 25 Feb. issue.

5 March—Swansea T.C. Electrical installations in aged people's dwellings, Brenig Rd, Penlan, Swansea. Applications to Borough Architect, Guildhall, Swansea, by above date.

7 March—Bangor. Electrical installation in R.U.C. District H.Q. at Bangor, Co. Down. —See 25 Feb. issue.

7 March—Bishop's Stortford U.D.C. Wiring work in 28 flats and communal block.—See 18 Feb. issue.

7 March—Branbridge. Electrical installation in existing maternity block at Branbridge Hospital.—See 25 Feb. issue.

7 March—Bristol T.C. Supply of: (a) curved bar sewage screens, raking gear and pumps; (b) penstocks; (c) comminutors; (d) electrically operated 10 ton and hand-operated 5 ton o/h cranes; (e) metering equipment. —Advertised 18 Feb. issue.

7 March—Buckley U.D.C. 7,200 yd of Group "A" lighting; (a) supply, erection and internal wiring of 25 ft concrete columns, 140 W sodium vapour discharge lamps, lanterns and control gear; (b) supply only of 140 W sodium lamps, lanterns, control gear and brackets.—Advertised 11 Feb. issue.

7 March—Cardiff T.C. Electrical installations in various council houses and flats.— See 18 Feb. issue.

7 March—Gloucester R.D.C. Installation of power points in 46 houses at Melville Rd, Churchdown. Surveyor, 29 Brunswick Sq, Gloucester.

7 March—Lancashire C.C. Electrical installation in Middleton Sub-divisional Police Headquarters. Applications to County Architect, P.O. Box 26, County Hall, Preston, by above date, reference A/G.

7 March—Londonderry. Supply of (item 17) lamps for year.—See 25 Feb. issue.

7 March—Manchester T.C. Supply and installation of 6·6 kV underground cables together with l.v. control cable at new Terminal Bldg, Manchester Airport.—See 25 Feb. issue.

7 March—N. Ireland Hospitals' Authority. Electrical engineering services in new outpatients and physiotherapy departments at Carrickfergus Hospital.—See 25 Feb. issue.

7 March—Radcliffe B.C. Supply and installation of 14—140 W sodium discharge lamps on 25 ft concrete columns with brackets and removal of 12 existing points along Countess La.—See 25 Feb. issue.

7 March—W. Riding C.C. Rewiring of installation at Harrogate Oatlands Mount Primary School.—See 25 Feb. issue.

7 March—Scunthorpe B.C. Wiring to modern standards in 243 council houses in Crosby area (groups of 22, 29, 30, 73 and 89 houses).—Advertised 11 Feb. issue.

7 March—Southgate B.C. Group "B" lighting: (a) supply of 630 lanterns and control gear for 60 W sodium vapour discharge lamps; (b) supply and erection of 15 ft concrete lamp standards and fixing lanterns, control gear and wiring.—See 25 Feb. issue.

7 March—Walsall T.C. Electrical repairs in council houses for two years from 1 April, 1960. Housing Manager, A. E. Bywater, Housing (Repairs) Dept., 7 Hatherton Rd, Walsall.

8 March—Hastings T.C. Electrical installations in 162 four-storey flats and maisonnettes at Halton redevelopment area.— Advertised 4 Feb. issue.

9 March—Co. Derry. Electrical installation in proposed extensions at voluntary school at Fallaghloon, Maghera. Details from architect and surveyor, M. A. Fitzpatrick, Strand Chmbrs, 16/18 Strand Rd, Londonderry. Deposit £2 2s.

9 March—Downpatrick. Electrical installation in new office building for Ministry of Finance, Room 103, Law Courts Bldg, Belfast 1.

9 March—Durham C.C. (a) Electrical installation in Durham Girls' Grammar School additions and alterations. Applications to County Architect, South St, Durham, by above date.

9 March—Kilmarnock T.C. Supply of (item 1) lamps.—See 18 Feb. issue.

11 March—Heston and Isleworth B.C. Supply and erection of 44 Group "A" steel columns with colour corrected mercury lamps, lanterns and control gear with the removal of 35 existing columns along B358. —Advertised 18 Feb. issue.

11 March—Luton B.C. Electrical installation in: (c) new science building, etc., at Luton High School, contracts by above date; (e) two public conveniences, Stockwood Pk, contracts by 4 March. Borough Architect, Town Hall, Luton.

11 March—N. Ireland Housing Trust. Electrical installations in: (1) 28 dwellings and one shop in Moat St, Donaghadee: (2) 57 flats at Cregagh; (3) 67 dwellings at Galgorm, Ballymena. Details from Trust Offices, 12 Hope St, Belfast.

12 March—Cheadle and Gatley U.D.C. Supply of lamps, lanterns, swan-neck brackets, switch boxes and concrete lighting columns.—See 18 Feb. issue.

12 March—Swansea T.C. Electrical installation in second phase buildings at Mynyddbach County Secondary School for Girls. Applications giving evidence of previous similar contracts to Borough Architect, Guildhall, Swansea, by above date. Deposit £5.

14 March—Bedworth U.D.C. Contract No. 2(i)(d): street lighting and other ancillary works in Stage 1 Roads and Sewers on Exhall Industrial Estate.—See 18 Feb. issue.

14 March—Co. Antrim. Electrical installation school meals accommodation at proposed new primary school, St. Colman's Station Rd, Greenisland. Details from consulting engineers, Varming and Mulcahy, 37 Malone Rd, Belfast. Deposit £5 5s.

14 March—Co. Down. Electrical installation, with electric floor-warming, in proposed new offices for County Surveyor's Department, at Galwally.—See 25 Feb. issue.

14 March—Down C.C. Electrical heating and ventilating installation in Central School meals kitchen at Newry. Details from consulting engineers, Barrett and Agnew, 420 Ravenhill Rd, Belfast 6. Deposit £3 3s.

14 March—Ellesmere Port B.C. Contract 292. Provision and erection of 80 concrete Group "B" street lamps, infilling between existing lamps.—See 25 Feb. issue.

14 March—Gravesend T.C. (b) Provision of heating circuit and one lighting point included in improvements to majority of 301 properties on Kings Farm estate.—See 25 Feb. issue.

14 March—Leeds T.C. Supply of (d) lamps for transport committee.—See 25 Feb. issue.

14 March—Manchester T.C. Electrical installation in Templemead Home for aged persons at Woodhouse Pk.—See 11 Feb. issue.

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources, including an index of trade information with over 100,000 entries

A Selection from the 105 queries answered this week

"The Fairway" echo sounder—makers of? T.B.—Marine Electronics Ltd., 38-40 Granville Rd, N.W.2.

"Timostat" thermostat and timing device—makers of? E.E.B.—Herga Electric Ltd., Herga Wks, Wallingford Rd, Uxbridge, Middx.

The Biax Flexible Drive and Tool Co. Ltd.—address for? E.E.B.—17 Queensberry Way, S.W.7.

"Heisyn" plugs—makers of? T.E.—Hellermann Ltd., Gatwick Rd, Crawley, Sussex.

"Easipump" pumps for washing machines—makers of? L.E.—Easiclene Porcelain Enamel (1938) Ltd., Kent Hse, Market Pl, Oxford Circus, W.1.

"Multilight" fluorescent fittings—makers of? L.E.B.—Utility Lamp and Fittings Co. Ltd., 53 Bolsover St, W.1.

"Denso" insulating tapes—address for? L.P.S.—Winn and Coales Ltd., Denso Hse, Chapel Rd, S.E.27.

"Kienzle" battery-operated clocks—address for? T.E.—Anglo-Time Corporation, 19 Hatton Gdn, E.C.1.

"Taylor" test sets—makers of? P.O.L. —Taylor Electrical Instruments Ltd., Montrose Ave, Slough, Bucks.

14 March—Sunderland R.D.C. Supply of electrical goods, fires and cable for 1960 housing programme. Surveyor: C. Emmerson, 2 The Esplanade, Sunderland.

15 March—Cardiff T.C. Electrical installation in Canton Grammar School for Boys at Fairwater.—See 25 Feb. issue.

15 March—Co. Armagh. Electrical installations in: (1) school building and (2) servery. Details from Liam P. Tierney, 3 Kildare St, Newry, N. Ireland. Deposit £5 5s.

15 March—Morley B.C. Supply and erection of 93 140 W sodium street lighting units. Public Lighting Engineer, Town Hall, Morley.—Advertised in this issue.

15 March—Thurrock U.D.C. Erection of columns and installation of electrical equipment for Groups "A" and "B" lighting. Engineer and Surveyor, Council Offices, Whitehall La, Grays. Deposit £2 2s.

16 March—Cardiff T.C. Street lighting erection, Contract No. 4: Erection of 210 Class "A" and 185 Class "B" concrete columns complete with fluorescent mercury and sodium lanterns/gear. City Surveyor, City Hall, Cardiff. Deposit £2 2s, payable to Cardiff Corpn.

16 March—Oxford T.C. Provision and erection of 20 Group "A" sodium discharge units at a mounting height of 35 ft plus three Group "B" units, contract includes supply and installation of ancillary equipment. City Engineer, Town Hall, Oxford.

17 March—Baildon U.D.C. Electrical installation, alterations and renewals in 26 houses on Towngate housing estate. Housing Manager, Town Hall, Baildon, Yorks.

17 March—Magherafelt R.D.C. (b) Provision of electrical services including telephone installation in new district offices. Details from consulting engineers, W. and M. Given, 1 Waterside, Coleraine. Deposit £3 3s.

18 March—Ugborough P.C. Installation of 12 140 W sodium lamps on 25 ft concrete columns on A38 at Bittaford. Clerk, Ugborough, Ivybridge, Devon.

21 March—Ealing B.C. (1) Supply of 56 200 W sodium lanterns and 44 Aero screened pattern, complete with gear and lamps; (2) supply and erection of 100 30 ft steel columns.—Advertised 25 Feb. issue.

21 March—Sunderland T.C. Electrical installations in (a) 253 dwellings and (b) 336 dwellings on Town End Farm estate.—Advertised 25 Feb. issue.

24 March—N. Ireland Hospitals Authority. Supply of (item 4) electrical appliances/equipment for S. Western Special Care Management Committee. Secretary, Tower Hill, Armagh.

5 April—Heston and Isleworth B.C. Supply and erection of 31 Group "A" steel columns with 3 x 80 W fluorescent lamps, lanterns and control gear plus removal of 29 existing columns along Whitton Rd, B361. Borough Engineer's Dept., 88 Lampton Rd, Hounslow. Deposit £2 2s.—Advertised in this issue.

6 April—E. Suffolk. Supply and erection on River Waveney at Bungay of one electrically operated mild steel sector type sluice gate, 20 ft wide by 7 ft high.—See 25 Feb. issue.

6 April—Yorkshire E.B. Supply of house wiring and mains auxiliary cables. Secretary, R. K. Richmond, Yorkshire Electricity Board, Wetherby Rd, Scarcroft, Leeds.—Advertised in this issue.

11 April.—Gateshead. (2) Electrical installation in new Divisional Fire Station to be erected in Dryden Rd for Newcastle and Gateshead Joint Fire Committee.—See 25 Feb. issue.

22 April—Galway C.C. Supply and installation of duplicate 3-ph. motors, horizontal centrifugal pumps and chlorination unit for Ballymoe Water Supply Scheme. Details from consulting engineers, H. C. L. O'Connor and Co., 4 Francis St, Galway. Deposit £5 5s.

No date stated—Barrhead T.C. Applications invited for inclusion in selected list of contractors for 156 all-electric, including floor heating, dwellings in two/three storey flats and cottage blocks at Aurs Drv in Auchenback scheme. Applications to Architects: Wm. Baillie and Son, 4 West Regent St, Glasgow.

Gazette Announcements

COMPANIES ACTS

D and R Electricals Ltd. Petition for winding-up to be heard before the High Court of Justice on 7 March. Persons intending to appear to notify Godfrey Warr and Co., 1 New Sq, Lincoln's Inn, W.C.2, by 1 p.m., 5 March.

Companies Winding-up

N.W.D. (Harrow) Ltd., retailers of domestic appliances.

Creditors were informed at a recent meeting that no statement of affairs had been filed but liabilities were estimated at about £40,000 and assets had been valued at £17,810. The company, formed in April, 1958, with a nominal capital of £100, had carried on business by means of door-to-door salesmen, with sales on credit from the finance house. Failure was attributed to dishonesty by salesmen, six of whom were convicted of fraud to the extent of £3,000, and heavy liabilities under recourse agreements. Mr. H. Evans, 2 Serjeants Inn, E.C.4, was appointed liquidator, with a committee of inspection.

J. and R. Appliances Ltd., retailers of domestic electrical equipment.

Creditors were told by the Official Receiver at a recent meeting that at present there were unsecured liabilities of £3,110, plus contingent liabilities under recourse agreements. Assets had been valued at £112.

The company was formed in April, 1958, and had an issued capital of £2, and traded from 65 Valley Hill, Loughton, until September, 1959, and then from 183 Wood St, London E.17.

Creditors passed no resolution and the case was left with the Official Receiver as liquidator.

BANKRUPTCY ACTS

First Meeting and Public Examinations

Halifax. G. Jones, patentee of electrical equipment, carrying on business as G. Jones and Sons, at 100 Furness Dr, Illingworth. First meeting: 11 a.m., 4 March, at Official Receiver's Office, 20 North Parade, Bradford 1; and public examination: 11 a.m., 25 April, at County Court, Prescott St, Halfiax.

Burnley. J. A. Haigh, electrical engineer, carrying on business as R. F. Haigh, at 8 Newton St, Colne. Public examination: 11 a.m., 12 April, at Court Hse, Bankhouse St, Burnley.

Releases of Trustees

Birmingham. W. F. Cowley and A. E. Groves, retailers of domestic appliances, carrying on business in partnership as Lu-Vac Domestic Appliances at Carr's La, Birmingham; 28 Martineau St, Birmingham; 153 Oxford St, Glasgow C.4; Barker's Chmbrs, Barker St, Shrewsbury; 195 Church St, Redfields, Bristol; and 91 St. Mary's St, Cardiff. Trustee, R. L. Davis, 58 Theobalds Rd, W.C.1, released as from 9 Dec.

Newcastle upon Tyne. J. E. Bowman, electrical engineer and contractor, carrying on business as Bowman Bros. at 21 Leazes Pk Rd, Newcastle. Trustee, R. B. Howard, Clarendon Hse, Clayton St West, Newcastle, released as from 11 Feb.

Receiving Orders

Salford. Elite Electrics, electrical and house furnishers, of 589 Liverpool Rd, Irlam. Receiving order dated 18 Feb.

Leeds. A. H. Freeman, electrical contractor, of 40 Wellhouse Dr, Roundhay Rd, Leeds 7. Receiving order dated 22 Feb.

Salford. I. Fineberg, known as I. Fine, and C. Wilson, retailers of electrical appliances, carrying on business in partnership as Modern Maid, at 28 Blackfriars St, Manchester 3. Receiving order dated 23 Feb.

TRADE NOTES

Changes of Address. As from 7 March the Panelec Heating Division of British Insulated Callender's Cables Ltd. will be transferred to 83/85 Saffron Hill, E.C.1. Telephone: Holborn 3994.

Startrite Engineering Co. Ltd. have moved to Darland Hall, Star Mill La, Chatham, Kent. Telephone: Gillingham 50151.

Additional Office. Square D Ltd. have opened a new field office at Lloyds Bank Chmbrs, Wellington St, Morley, Leeds (Morley 369), under the management of Mr P. Wyer.

New Branches. F'AG Bearing Co. Ltd., of Wolverhampton, have opened branch offices at 86 Bristol St, Birmingham 6, and at 69 Temple St, Wolverhampton. The branch managers are Mr E. B. Steer (Birmingham) and Mr V. Sedgeley (Wolverhampton).

Bill Switchgear Ltd. purchased new premises at Watkin St, Blackfriars Rd, Salford, Manchester 3, and recently held an "open day" for visitors.

Hall Harding Ltd. have opened a showroom at George St, Bath.

Instrument repairs, installations, maintenance and engineering work previously carried out by McKellen Automation Ltd. has now been taken over by a newly formed associated company: Automac Ltd., Throstle Grove Wks, Great Egerton St, Stockport, Ches (Tel.: Stockport 6767).

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon Hse, Theobalds Rd, W.C.1, quoting reference.*

15 March—America. One 103 MVA 3-ph. transformer with appurtenances and nine 68,667 kVA 3-ph. transformers with appurtenances. U.S. Army Engineer District, Omaha, 1709 Jackson St, Omaha 2, Nebraska. B.o.T. (ESB/4928/60).*

20 March—Belgium. N.A.T.O. Infrastructure contract DPL.3/60, value £4,900—66 1, 2 and 3 kW heaters. Ministere de la Defense Nationale de Belgique, Service Generale des Construction Militaires, Direction Pipeline, Caserne Prince Baudouin, Place Dailly, Bruxelles. B.o.T. (GD/6724/59/(7)).*

31 March—Malaya. (i) One 350 kVA standby diesel generating set; (ii) o.c.b's and switches for Kajang Transmitting Station. Director of Broadcasting, Federal Hse, Kuala Lumpur. B.o.T. (ESB/4762/60).*

9 April—Jordan. Two 3 MW free piston gasifiers—gas turbine sets and two 3 MW diesel engine alternator sets. General Manager, Transjordan Electric Power Co., P.O. Box 618, Amman. B.o.T. (ESB/4801/60/ICA).*

13 April—America. Eight 61,579 kVA hydraulic turbine-driven generators for Big Bend Reservoir Project, near Fort Thompson, S. Dakota. U.S. Army Engineer District, Omaha, 1709 Jackson St, Omaha, Nebraska. B.o.T. (ESB/4907/60).*

20 April—Australia. 13 station type lightning arrestors, base insulators and four surge counters for use on a 132 kV system for Cairns Regional Electricity Board. Agent-General of Queensland, 409/410 Strand, W.C.2. (ESB/4852/60).*

9 May—India. One 150,000 lb/hr at 425 p.s.i.g. and 775°F or 900 p.s.i.g. and 925°F water tube boiler, etc. for Ramagundam Boiler Extensions. Specification APT.44/59 on production of challen for £5 14s 9d from Superintending Engineer (Technical), Government of Andhra Pradesh Electricity Dept, Hyderabad, Deccan.

BUSINESS PROSPECTS

Home

Aylesbury R.D.C. 12 flats, 16 bungalows and 16 houses. Raymond White and Ridley, 4 Temple Sq.

Barrhead B.C. Erection of two- and three-storey flats and cottage blocks (156 houses) at Aurs Drive site. Architects: Wm. Baillie and Son, 4 West Regent St, Glasgow.

Beverley R.D.C. Five blocks two-storey flats at Welton and Brough. Architect: G. Palfreyman, 22 Lair Gate.

Birkenhead B.C. Erection of Girls' High School at New Hey Rd. Borough Architect.

Boldon U.D.C. Plans for erection of 102 houses at Wellands La approved. Surveyor: J. T. Edmondson.

Buckinghamshire C.C. School building projects totalling £52,000. County Architect.

Caistor R.D.C. Construction of 12 bungalows on four local sites. Architects: Wm. Saunders and Partners, 24 Castle Gate, Newark-on-Trent.

Cornwall C.C. Extensions to Bude-Stratton County Secondary School. County Architect.

Cumberland C.C. To place contract for additional classroom, etc., at Gilsland School. County Architect.

Durham C.C. Extensions and alterations, totalling £158,000, to Grammar School. County Architect.

East Suffolk C.C. Erection of school of 26,500 sq ft floor area near Lowestoft. County Architect.

East Sussex C.C. Erection of clinic at Portslade. County Architect.

Gateshead T.C. To erect £15,000 community centre at Lobley Hill Rd and £11,000 nursery school at Bensham Grove. Borough Engineer.

Gillingham B.C. Rebuilding two dwellings at Bonnington Green. Borough Engineer.

Gloucestershire C.C. Erection of home, 16,700 sq ft floor area, at Charlton Kings. County Architect.

Hampshire C.C. Erection of 1,300 sq ft Court Room. County Architect.

Hartlepool B.C. Plans prepared for erection of 71 houses and garages near King Oswy Drive. Borough Engineer.

Hebburn, Co. Durham. Plans approved for alterations to Hebburn Trades and Labour Club. Architect: R. Collins, St. Hilda St, South Shields.

Leeds T.C. Erection of 240 houses on two sites in the city. Town Clerk.

Leyland U.D.C. Erection of one block of eight dwellings at Fox La. Council Engineer.

Ludlow B.C. Erection of six houses at Sandpits Ave. Town Clerk.

Margate B.C. Erection of public library at Westgate. Borough Engineer.

Morley B.C. Erection of 78 houses on Moorhead estate, Gildersome. Borough Engineer.

Neston U.D.C. Erection of 50 dwellings on Clayhill estate. Borough Engineer.

Pembrokeshire C.C. Erection of police station at Milford Haven. County Architect. E.C.: new dining hall and scullery at Neyland C.P. School. County Architect.

Reading B.C. Construction of lift shaft, etc., at 1-4 Southern Hill. Borough Architect.

Rochdale B.C. Erection of clinics at Spotland and Kingsway, and alterations to two schools. Borough Surveyor.

Rutland C.C. Extension to Uppingham Secondary Modern School. County Architect.

Scarborough B.C. Erection of 24 flats at Scalby Rd. Borough Engineer.

South Shields. Boots the Chemists Ltd., Nottingham, to spend £35,000 on reconstruction of their premises at King St. T.C. Hostel for students to be built at Westoe Drive for E.C.

Southampton B.C. Tenders for erection of kitchen dining room at Woolston Secondary School. Town Clerk.

Southwell R.D.C. 12 bungalows at Clipstone. Architect: M. England, Westgate.

Stockport. £53,150 training centre at Chinley approved by Ministry.

Stockton-on-Tees. Marshall and Tweedy, 36 Blackett St, Newcastle, are architects for new premises in Stockton of Newcastle Savings Bank Ltd.

Stretford. To add two-form instalment of three-form entry school for girls to building programme.

Stroud U.D.C. Erection of 108 flats, 29 houses, 25 bungalows, communal hall and garages at Paganhill. Council Architect.

Surrey C.C. To approve plans for £29,414 alterations at County Girls' School, Wimbledon.

Swindon B.C. To consider erecting 400 dwellings on large sites in town. Town Clerk.—Scheme for 63 and 52 dwellings and garages. Borough Architect.

Thornaby-on-Tees B.C. Erection of 20 flatlets in two-storey block including communal rooms. Town Clerk.

Truro T.C. Erection of 28 houses on Malabar estate. City Engineer.

Wandsworth B.C. Tenders for erection of four-storey block of 32 flats at St. Alphonsus Rd, Clapham. Town Clerk, Municipal Bldgs. S.W.18. Erection of 20 flats in two- and three-storey blocks at Clapham Manor St. Town Clerk. Tenders for erection of 49 flats and maisonnettes in two seven-storey blocks at Brixton Hill. Town Clerk.

Wells-next-the-Sea, Norfolk, U.D.C. 20 two-bedroomed bungalows and garages at Church Marsh. Architect: W. A. J. Spear, 36 Cattle Market St, Norwich.

West Hartlepool T.C. Plans approved for extension to Girls' School. Architect, L. Auton, Regents Bldgs, York Rd.

West Suffolk. Standing Joint Committee approve scheme for £30,250 police station and courthouse at Haverhill.

Weymouth B.C. To approve erection of £75,000 factory at Chickerell Industrial Estate.—Co. E.C. approve extensions at Training College. Cost £45,704.

Whickham U.D.C. To build 69 houses at Athol St and Victoria St, Dunston. Architects: Rennel and Baddiley, Bridge End Chmbrs, Chester-le-Street.

Whitby U.D.C. Architect: J. S. Houghton, 9 Skinner St, prepared plans for seven maisonnettes, 14 flats and two shops at Haggersgate.

Whiteabbey. Reconstruction of hospital block approved by the Hospitals' Authority. Newtownabbey Hospital Management Committee.

Whitley Bay T.C. Wilson and Wilson, St. Andrew's Bldgs, Gallowgate, Newcastle, architects for 102 houses on Whitley Lodge estate.

Winsford U.D.C. 42 dwellings and garages at Dene estate, Winsford. Council's Engineer.

Wrexham B.C. Actor Park estate development plan approved. 386 houses, 48 flats and sites for 343 private dwellings.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons Ltd., 116 Chancery La, W.C.2.

Bulldog Batteries Ltd., 27 Queen Anne St, W.1. Manufacturers of and dealers in electrical goods, etc. Nom. cap.: £100. Dirs.: Wm. S. Shepherd and Betty H. Shepherd.

Harris Engineering Sales (U.K.) Co. Ltd., York Wks, Browning St, S.E.17. Nom. cap.: £1,000. Dirs.: Albert E. Harris and David R. Harris.

Hayes and Walker (Sheen) Ltd., 141 Sheen La, S.W.14. Manufacturers of and dealers in electrical and mechanical apparatus, etc. Nom. cap.: £1,000. Dirs.: Sydney Hayes and Gladys R. Hayes.

Hobday Electrical Ltd. To carry on business of dealers in electrical goods, etc. Nom. cap.: £100. Dirs.: not named. Subs.: Bruce M. Adam and Derek Hayes, Dowgate Hill Hse, E.C.4.

J. and B. Electrics (London) Ltd., 38 Roundwood Rd, N.W.10. To take over the business of electrical engineers and retailers carried on at Willesden by B. C. Oliver, etc. Nom. cap.: £500. Permanent dirs.: Brian C. Oliver, Maureen Oliver and Maurice G. E. Monger.

Newmatic Appliances Ltd. Manufacturers of and dealers in electrical apparatus, etc. Nom. cap.: £100. Permanent dir.: Morris H. Davis, 75 Churston Ave, E.13; and Alan Goldman, 93 Clark St, E.1.

Park Appliances Ltd., 30 Clarendon Rd, Harrow, Middx. Retailers, distributors, wholesalers, manufacturers of and dealers in washing machines, electric irons, fans, refrigerators, etc. Nom. cap.: £100. Dirs.: Harry C. Webb and Mrs Annie E. Nunn.

W. H. Taylor (Wolverhampton) Ltd. Electrical, radio, lighting, telephone, mechanical, civil and general engineers, etc. Nom. cap.: £5,000. Dirs.: Wm. H. Taylor, Gorse Hollow, 1 Short Ave, Allestree, Derby; Stanley F. Wall, "Downswold," 20 Rookery La, Penn, Wolverhampton; and Rodney D. Taylor.

Wessex Electric Sales Ltd., 8 Forbury, Reading, Berks. Nom. cap.: £100. Dirs.: Robt. D. Burrows and Ronald E. G. Tigwell.

Weyman Frames Ltd., 3a Church St, Slough. Designers, manufacturers of and dealers in wire and wire goods, in particular lamp shades and electrical fittings, etc. Nom. cap.: £1,000. Dirs.: Mrs. Sarah A. F. Jaques, Leslie S. J. Jaques and Horace S. Lowther.

CONTRACTS PLACED

Durham C.C. Lift installations in new County Hall at Aykley Heads, W. Wadsworth and Sons Ltd., £44,941.

Ealing B.C. Supply and erection of 146 Group "A" street lighting points on Western Ave. Abacus Eng. Ltd.

Newcastle-on-Tyne T.C. Electrical installation in new Rutherford College of Technology (stage 4). A. S. Lowery and Son Ltd., £14,016.

Stockton-on-Tees T.C. New municipal buildings: electrical installation, Cox-Walkers Ltd., £13,014; internal communications system, Siemens Edison Swan Ltd., £2,685.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Belair. B791,796. Class 11. Space heaters. A. and S. Electrical Co. Ltd., 133 Moorgate, E.C.2.

Bendix. 795,359. Class 7. Washing machines. Bendix Home Appliances Ltd., Albion Wks, Kingsbury Rd, Birmingham 24.

Candy. B789,755. Class 7. Washing machines, etc. G.B.C. Electronic Industries Ltd., 121/3 Edgware Rd, W.2.

Hydromeg. 793,079. Class 17. Insulating varnishes, etc. Lewis Berger (Gt. Britain) Ltd., Berger Hse, Berkeley Sq, W.1.

Levolog. 792,813. Class 9. Apparatus, etc. Thomas Industrial Automation Ltd., 71/73 Station Bldgs, Altrincham, Ches.

Philips. 789,447. Class 7. H.V. generators, etc. 789,448. Class 9. Ion accelerators, etc. Philips Electrical Ltd., Century Hse, Shaftesbury Ave, W.C.2.

Company Meeting

THE ENGLISH ELECTRIC GROUP

INCREASED TURNOVER

Lord Nelson of Stafford on Keener Competition and Falling Margins

THE Annual General Meeting of The English Electric Company Limited and its major subsidiaries in the United Kingdom will be held on March 17th in London.

In the course of his statements circulated to stockholders the Chairman, Lord Nelson of Stafford, said:

The English Electric Company

Once again I am able to report a substantial increase in our turnover. The volume of the Group's business has shown a steady growth over the past 20 years and has doubled since 1953. This reflects great credit on the vision of our research and development staff, on the efforts of those who work in our great factories and the devotion of the members of our commercial organisation at home and overseas.

Although our traditional business continues to expand, competition is fierce, prices are keen, and our margins are even narrower than hitherto. We have succeeded in increasing our earnings by securing a larger volume of business at a lower profit rate.

1959 Turnover Analysed

As in previous years, I give you the following breakdown of every £10 we have received of our 1959 turnover:

Raw materials and bought out and semi-finished articles embodied in our own products		47.96
Wages and Salaries ...		33.21
Depreciation, maintenance, power, heat, light, rent, rates, insurance, etc. ...		13.83
Interest in debentures, bank overdraft and bills ...		1.23
		96.23
Taxation	1.41	
Retained in the business ...	1.31	
Net dividend on Preference and Ordinary stocks ...	1.05	
		3.77
		100.00

Improvement in World Trade

The last 18 months have shown signs of a revival of activity from the world-wide recession of some two years ago and there was also a slight but encouraging rise in world trade in electrical engineering goods in 1959. The economic indicators both in this country and overseas seem to point generally to a further rise in activity in 1960. Furthermore, the long-term trends show that the world consumption of electrical power is growing at the rate of 7 or 8 per cent per annum and I confidently expect that progress to continue and to give rise to an increased demand for our products in the years ahead.

Nevertheless I must emphasise that the expansion total demand so far has been largely on durable consumer goods; in fact in heavy electrical products there is acute competition and with the resurgence of manufacturing activity in Western Europe and Japan there has emerged a state of over-capacity in relation to world demand.

Export orders are secured only at prices so disappointingly low as to fail to provide adequate margins which are essential to cover large-scale expenditure on research and development.

Our volume of business continues to rise and during 1959 we took orders to a value of £14m higher than we did in 1958, but prices are much keener and profit margins are much lower than is healthy for this type of business.

Need for Stable Conditions and Reduced Costs

In the United Kingdom it is essential for the Government of the day to create, so far as is within its power, a stable monetary position within which it is the task of industry to secure sufficient business to provide stable employment for its employees. We should congratulate HM Government on its success in providing stable conditions and look forward to the continuation of the policies that have brought this about.

The Chancellor of the Exchequer has referred in several speeches to the need to reduce prices in certain sectors of the economy in order to maintain the overall price stability already achieved. I agree with this analysis and if there are reductions in certain of the materials we purchase, if wage and salary claims are restrained and related to economic facts, then we shall be free from the upward pressure on costs which we felt so severely during the years of inflation. It is for each of us to pursue by every means in our power the reduction of costs—whether by improvements in design or manufacturing technique or by economies in overhead expenditure.

Important Events

Power Generation: We continue to occupy a leading position as suppliers of generating plant for power stations all over the world, and the development and manufacture of steam and hydro-electric turbines for these stations will continue to be one of the most important of our activities. At the same time our activities in atomic engineering have continued to expand.

Aviation: As announced in January, the Bristol Aeroplane Company, Vickers Limited, and ourselves have decided to amalgamate our aircraft and guided weapon companies. The arrangements have been welcomed by the Minister of Aviation, who regards the proposed new joint company as constituting one of the major aviation groups which would qualify for Government support.

Traction: We are playing a major role in the modernisation of the British railway system both in the supply of diesel and electric locomotives and of other traction equipment.

Domestic Appliances: The domestic appliance activities of your Company have expanded very considerably in the past year, and the future prospects are encouraging.

Marconi's Wireless Telegraph Company

Competition has again been extremely severe and this, together with the heavy investment in research and development, has contributed to a Group profit somewhat less than in 1958. However, we are meeting competition by increased efficiency and turnover—indeed our order book during the current year is the highest since 1951.

The Company is playing an important part in air defence and secured a £7m order last year from NATO for a complete early warning radar chain. The Swedish Government also has entrusted a major part of their defence needs to the Marconi Company, who have been given a £1½m contract for a most advanced data handling air defence system.

Marconi International Marine Communication Company

The recession conditions which seriously affected the shipping industry in 1958 continued into 1959, although there were welcome signs of improvement towards the end of the year.

The strength of our Company and the unique value of its comprehensive world-wide servicing organisation are reflected in the profit figures covering a year of difficult trading conditions in the marine field. By broadening the basis of our activities; by vigorous selling at home and abroad; and by stepping up efficiency in every department of the Company we have been able to effect yet further improvement in the already high quality of our service to our clients, at the same time maintaining our forward progress.

The English Electric Valve Company again increased its output and turnover to new record figures, with trading results making a very satisfactory contribution. The Company's share of the market has been increased both at home and abroad.

D. Napier and Son.—Results for the past year are disappointing, inasmuch as a long and satisfactory profit record has been interrupted by a loss. Measures have been taken to rectify the position of Napier's and a substantial improvement is expected during 1960.

The technical merits of our Eland engines have been demonstrated by the considerable success with which we have broken into the American market. The Gazelle engine is being installed in several helicopters manufactures in this country. The Deltic diesel has become an engine of considerable significance in railway modernisation in addition to its marine and stationary applications. There also continues to be a satisfactory volume of business for Napier turboblowers and the Napier Spraymat De-icing System.

Vulcan Foundry Group.—The trading results again show a marked improvement, due partly to an increase in turnover and partly to the increase in efficiency arising from our continuing policy of progressive modernisation.

MEETINGS TO NOTE

THURSDAY, 3 MARCH

I.E.E. (Joint meeting with Institutions of Civil and Mechanical Engineers). "The Engineer and Civilisation," Sir Hugh Beaver. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (Southern Centre). "Nuclear Magnetism," J. E. Wood. South Dorset Technical College, Weymouth.

FRIDAY, 4 MARCH

I.E.E. (Medical Electronics Discussion Group). "Direct Writing Oscillographs," Savoy Pl, W.C.2. 6 p.m.

I.E.E. (N.E. Centre). "The Design and Performance of the Gas-filled Cable System," E. P. G. Thornton and D. H. Booth. Carlisle Technical College. 7 p.m.

MONDAY, 7 MARCH

I.E.E. (Electronics and Communications Section). "An Introduction to the Theory of Masers with Particular Reference to the Travelling-wave Maser," P. N. Butcher. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (N.E. Centre). "Protection of Electrical Systems," H. G. Bell. Neville Hall, Westgate Rd, Newcastle-on-Tyne. 6.15 p.m.

I.E.E. (S. Midlands Centre jointly with Graduate and Student Section). Three student papers. James Watt Memorial Institute, Birmingham. 6.30 p.m.

I.E.E. (S. Midlands Centre). "Masers," M. H. Oliver. Winter Gdns, Malvern. 7.30 p.m.

A.S.E.E. (Bolton Branch). "Protective Equipment for Industrial Plant," Dr W. L. Stern. Railway Hotel, Trinity St. 7.45 p.m.

A.S.E.E. (C. London Branch). "Electrical Contracting," J. Flood. White Hall Hotel, Bloomsbury Sq, W.C.1. 7.15 p.m.

N.E. Electrical Club. "Diesel Electric Tugs," C. Smith. County Hotel, Neville St, Newcastle. 6.30 p.m.

A.S.E.E. (Essex Branch). "Insulating Varnishes," J. S. Hann. Angel Hotel, Ilford. 8 p.m.

I.E.S. "Current Applications of Electroluminescence," P. W. Ranby. Federation of British Industries, Tothill St, S.W.1. 6 p.m.

E.P.E.A. (London Technical Group). "Recent Developments in Boiler Plant," R. Bagley and A. H. Parish. Lancaster Room, Caxton Hall, S.W.1. 7 p.m.

TUESDAY, 8 MARCH

E.D.A. Annual Conference and Exhibition at Harrogate, until 11 March.

I.E.E. (N.E. Centre). "The Reliability and Life of Impregnated-paper Capacitors," J. P. Pitts. Workington College of Further Education. 7 p.m.

I.E.E. (N.W. Centre). Annual dinner at Midland Hotel, Manchester. 6.45 p.m.

I.E.E. (N. Ireland Centre). "The Recognition of Moving Vehicles by Electronic Means," T. S. Pick. David Keir Bldg, Queen's University, Stranmillis Rd, Belfast. 6.30 p.m.

I.E.E. (S.W. Scotland Sub-Centre). "Future Generation and Transmission Development in Scotland," J. Henderson. Kilmarnock.

I.E.E. (N. Staffs Sub-Centre). Faraday Lecture, "Electrical Machines," Professor M. G. Say. Town Hall, Hanley. 7.30 p.m.

I.E.E. (S.E. Scotland Sub-Centre). "Water-turbine-driven Induction Generators," C. L. C. Allen. Carlton Hotel, North Bridge, Edinburgh. 7 p.m.

I.E.E. (N. Midlands Graduate and Student Section). "Operational Aspects of Modern Power Stations," M. MacLeod. Parkinson Bldg, Leeds University. 7 p.m.

A.S.E.E. (Chester Branch). "Protective Equipment for Industrial Plant," Dr W. L. Stern. Westminster Hotel, City Rd, Chester. 7.45 p.m.

A.S.E.E. (York Branch). "Infra-red and Its Applications," K. Cruickshanks. Georgian Hse, Blossom St. 7.30 p.m.

WEDNESDAY, 9 MARCH

I.E.E. (Supply Section). "The Impulse Strength of Impregnated-paper Dielectrics as Used in h.v. Cables," B. Salvage and J. A. M. Gibbons. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (Southern Centre). "Transmission of News Film over the Transatlantic Cable," C. B. B. Wood and I. J. Shelley. S.E.B. Showrooms, Salisbury. 6.30 p.m.

I.E.E. (N. Lancs Sub-Centre). "The Deltic Locomotive," C. M. Cock. N.W.E.B. Demonstration Theatre, Friargate, Preston. 7.15 p.m.

I.E.E. (Rugby Sub-Centre). "The Application of Irradiation in Industry," M. C. Cowley-Milling. Rugby College of Technology and Arts. 6.30 p.m.

I.E.E. (Oxford District). "Automation of the National Telephone System," H. E. Francis. S.E.B. Service Centre, 37 George St. 7 p.m.

Plastics Institute (Yorks Section). "P.V.C. Coated Metals," W. E. Martin. St. Mark's Hse, 186 Woodside La, Leeds 2. 7.15 p.m.

Newport and District Electric Club. "New Materials and Their Effect on Transformer Design," J. F. Yates. King's Head Hotel, Newport, Mon. 6.30 p.m.

Institute of Fuel. "Nuclear Power for Marine Propulsion," J. E. Richards. Institution of Civil Engineers, Gt. George St, S.W.1. 5.30 p.m.

Institute of Fuel (N.W. Section). "Problems With the Use of High Sulphur Oil Fuels at Marchwood Power Station and Experience With Chemical Additives," J. T. Wilkinson and D. Clarke. Engineers' Club, Albert Sq, Manchester 2. 2.30 p.m.

THURSDAY, 10 MARCH

I.E.E. (Utilisation Section). "Some Considerations in the Application of Power Rectifiers and Converters," J. P. McBreen. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (N. Lancs Sub-Centre). "The Deltic Locomotive," C. M. Cock. N.W.E.B. Demonstration Theatre, Duke St, Barrow. 7.15 p.m.

I.E.E. (N. Scotland Sub-Centre). "Silicone Electrical Insulation," J. H. Davis. Electrical Engineering Dept., Queen's College, Dundee. 7 p.m.

I.E.E. (W. Wales Sub-Centre). "Subscriber Trunk Dialling," D. A. Barron. Conference Room, S. Wales E.B. Showrooms, The Kingsway, Swansea. 6 p.m.

I.E.E. (Irish Branch). "Aviation Communications and Navigational Systems," G. E. Enright. Physical Laboratory, Trinity College, Dublin. 6 p.m.

I.E.S. (Manchester Centre). "Characteristics and Applications of Photo-Cells," F. A. Benson. Demonstration Theatre, Town Hall Extension, Manchester. 6 p.m.

FRIDAY, 11 MARCH

I.E.E. (Electronics and Measurement Sections). Dinner/dance at Café Royal. 7 p.m.

I.E.E. (N. Scotland Sub-Centre). "Silicone Electrical Insulation," J. H. Davis. Robt. Gordon's Technical College. 7.30 p.m.

I.E.E. (N.E. Graduate and Student Section). "Cooling of Large Alternators," R. M. Gledson. Grey Hall, King's College, Newcastle. 6.30 p.m.

Junior Institution of Engineers. "Refrigeration at Sea," D. W. Higham. Pepys Hse, 14 Rochester Row, S.W.1. 7 p.m.

GOBLIN (B.V.C.) LIMITED

(Originators of the Vacuum Cleaner)

EXPANSION OF BUSINESS

THE 56th Ordinary General Meeting of Goblin (B.V.C.) Limited was held on February 25 at Leatherhead.

Mr. O. D. Angell (the chairman) presided, and in the course of his speech said: We have been especially pleased to report a group nett profit of over one quarter of a million pounds, this figure being arrived at in the Consolidated Accounts after absorbing losses suffered principally by our subsidiary company in Canada.

Naturally much endeavour is being made to obviate any losses by our subsidiaries, but there are times when conditions beyond the control of our executives create the reason for a loss, and I think it will be agreed by all that such events must be brought into perspective by relating them to the past history of earning ability, the present strategic value of retaining such footholds and the assessment of the future potential.

On such counts we are quietly confident regarding our interests in Canada and Germany, and although the South African picture is less distinct we believe that with careful direction of effort worthwhile results can be obtained.

The expansion of our business has been much in line with our planning and we were in a good position to take our share of improved trading conditions brought about by freedom of hire purchase and credit controls.

Our results last year were such that we have decided to recommend the highest payment of dividend ever made by your company; this is, nevertheless, well covered by present available earnings, and we trust capable of being maintained in future.

FINANCE

Referring to his comments a year ago that, given the anticipated further improvement in their earning ability, the Board would seeks to place the finances of the Company on a more permanent basis, the chairman said: Your Board still have this very much in mind, but the timing of such action must obviously be carefully chosen.

In the meantime we have taken one further step in the building up of our group structure towards a situation in which we can happily go to our shareholders asking them to help us to provide the permanent finance which will in due course be required.

The further step to which I refer is the acquisition of an old established company which has much to offer us by way of additional manufacturing facilities and an established production and marketing business of a respected Trade name.

We believe in our future and our financial needs will not be small, but we wish our planning and timing to be such that shareholders will quickly emerge in a stronger position not thwarted by a watered down capital which could restrict their earnings potential; that our executive and employees will be content in the security and reward which should be theirs; and the Directors I trust never complacent but eager to go forward once again in the bettering of your company.

Our domestic equipment has proved acceptable to the customer and the progress of our industrial business has gathered pace, entering new fields and consolidating the innovations referred to last year.

Our new electric motor manufacturing plant is working well and further plant reorganisation is in progress.

I am pleased to report that in spite of increased competition on the domestic front, intensified by foreign competition, we are fully maintaining our overall position in our markets compared to the corresponding months of our last accounting period.

The report was adopted.

MULTAN GAS TURBINE

Power for Pakistan

At Multan, the first of two gas turbines ordered by the Pakistan Water & Power Development Authority, has recently begun to deliver electrical power. The gas turbine unit is operating on natural gas, but has been designed to run also on gas oil. The nominal rating of the unit is 5,700 kW with an ambient temperature of 40°C; but the alternators are designed for a larger output to take advantage of the extra power which can be generated at lower ambient temperatures. With an ambient temperature of 18°C, an actual output of 7,400 kW has been obtained.

The second gas turbine, originally intended for Multan, is now to be installed at Hyderabad. Erection of this unit will commence shortly and it will be in service later in the year.

Both units – which are identical – were built in the works of Richardsons Westgarth (Hartlepool) Ltd., to Brown Boveri designs. At Hartlepool, Richardsons Westgarth also produce steam turbo-alternators for public electricity supply and industrial use, axial and centrifugal blowers and exhausters to Brown Boveri designs, water-tube boilers of Foster-Wheeler design, Economic type boilers, feed heaters, condensers, rotary cooling-water strainers . . . in fact all the major equipment for power stations.

THE RICHARDSONS WESTGARTH GROUP

Co-ordinating the activities of

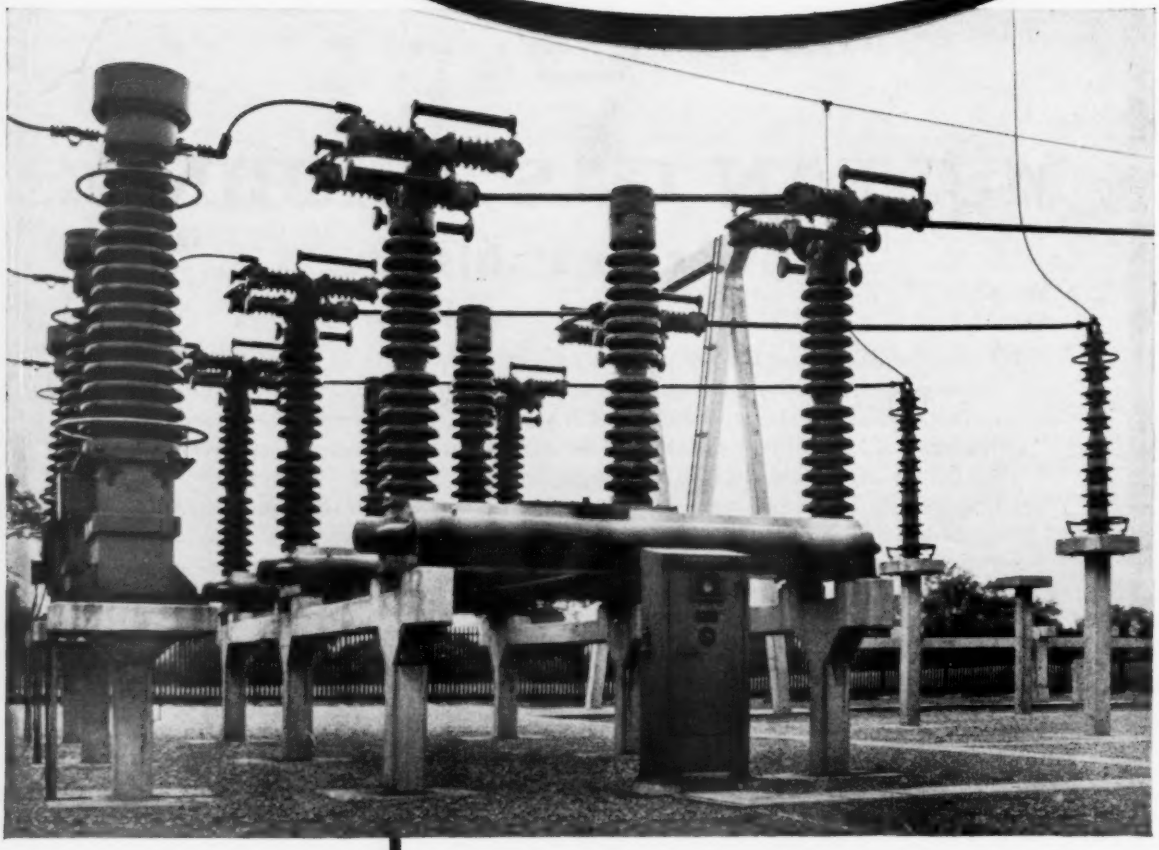
THE NORTH EASTERN MARINE ENGINEERING CO. LTD. — RICHARDSONS WESTGARTH (HARTLEPOOL) LTD.
PARSONS MARINE TURBINE CO. LTD. — THE HUMBER GRAVING DOCK & ENGINEERING CO. LTD.
GEORGE CLARK (SUNDERLAND) LTD. — RICHARDSONS WESTGARTH ATOMIC LTD.
RICHARDSONS WESTGARTH, INC.

ASSOCIATED COMPANY: ATOMIC POWER CONSTRUCTIONS LTD.

RICHARDSONS, WESTGARTH & CO. LTD., WALLSEND, NORTHUMBERLAND

RW 56A

AEI Switchgear to control TRAWSFYNYDD'S 500-MW output



275-kV air blast circuit-breakers of the type to be installed at Trawsfynydd, North Wales.

Power from the Central Electricity Generating Board's 500-MW Trawsfynydd nuclear power station will be controlled by 275-kV air blast circuit-breakers supplied by AEI.

Britain's third nuclear power station with AEI switchgear
Trawsfynydd is the latest of three United Kingdom nuclear stations at which power supplied for the British Grid will be controlled by circuit-breakers of AEI manufacture. Both the Berkeley and Hunterston nuclear stations have been supplied with AEI switchgear.

For further details write to AEI Switchgear Division, Trafford Park, Manchester 17

AEI

Associated Electrical Industries Limited
SWITCHGEAR DIVISION
Trafford Park, Manchester · Higher Openshaw, Manchester · Willesden, London
F/A912

CLASSIFIED ADVERTISEMENTS

TENDERS INVITED

BOROUGH OF HESTON AND ISLEWORTH

Street Lighting Improvement

WHITTON ROAD, HOUNSLOW (B361)

TENDERS are invited for installing Group "A" street lighting in Whitton Rd (Hanworth Rd to borough boundary) including removing 29 existing columns and supplying and erecting 31 steel columns with three 80 watt fluorescent lamps, lanterns and control gear. On deposit of £2 2s (returnable if a bona fide tender is received and not withdrawn) the bill of quantities, specification and form of tender may be obtained from, and the conditions of contract and drawings seen at, the Borough Engineer's Department, 88 Lampton Rd, Hounslow. Tenders, in endorsed envelopes supplied, not indicating the tenderer, must be delivered to me by 10 a.m., 5 April, 1960. The Corporation are not bound to accept any tender.

D. MATHIESON,
Town Clerk.

Town Hall,
Hounslow, Middlesex. (P 281)

YORKSHIRE ELECTRICITY BOARD

House Wiring and Mains Auxiliary Cables

TENDERS are invited for the supply and delivery of House Wiring and Mains Auxiliary Cables.

Specification and Tender Forms can be obtained upon application to the Secretary.

Closing date for receipt of Tenders will be noon on Wednesday, 6 April, 1960.

The Board does not bind itself to accept the lowest or any Tender.

E. K. RICHMOND,
Secretary.

Wetherby Rd,
Scarcroft,
Leeds. (P 298)

BOROUGH OF EALING

Street Lighting—Western Avenue

1. Supply of 56 200 W Sodium Lanterns and 44 Aero Screened Pattern complete with gear and lamps.

2. Supply and erection of 100—30 ft mounting height steel columns.

Details obtainable from Borough Engineer, Town Hall, Ealing, W.5, on payment of £5 for each tender, returnable on receipt of a bona fide tender.

Tenders to Town Clerk, Town Hall, Ealing, W.5, by noon, 21 March, 1960. (P 222)

BOROUGH OF MORLEY

Street Lighting Department

TENDERS are invited for the supply and erection of 93—140 watt Sodium street lighting units on roads within the Borough.

Forms of tender may be obtained from the Public Lighting Engineer, Town Hall, Morley, and should be returned to the undersigned not later than 9 a.m. on Tuesday, 15 March, 1960.

E. V. FINNIGAN,
Town Clerk.
(P 303)

APPOINTMENTS VACANT

CENTRAL ELECTRICITY GENERATING BOARD

South Western Division

STATION CHEMIST

REQUIRED at Newton Abbot Power Station.

Superannuation scheme. Salary: N.J.B. Class F, Grade 7, £910/£955 per annum.

Candidates should possess H.N.C. in Chemistry or equivalent and have had experience in the testing and analysis of fuels, oil and the control of water conditions.

Applications on form AE6/ACT obtainable from the Divisional Secretary, 26 Oakfield Rd, Bristol 8, should be completed and returned by 12 March, 1960. (P 290)

NOTTINGHAM AND DISTRICT TECHNICAL COLLEGE

Burton Street, Nottingham

Principal: D. A. R. Clark, M.SC.(TECH.), M.I.MECH.E.

APPLICATIONS are invited from suitably qualified persons for the following posts. Previous teaching experience, although not essential, is desirable.

LECTURER IN ELECTRICAL ENGINEERING

with experience in one or more of the following subjects: Illumination; Power System Analysis; Telecommunications; High Voltage Techniques.

ASSISTANT LECTURER, GRADE B, IN ELECTRICAL ENGINEERING

Experience in utilisation and installation of electrical plant, industrial instrumentation or illumination an advantage.

Salaries in accordance with the Burnham Technical Scale as follows:

Lecturer: £1,370 x £35—£1,550 per annum.

Assistant Grade B: 700 x £27 10s—£1,150 per annum plus additions for qualifications and training. Commencing salary according to previous experience.

Facilities and equipment available and time allowed for approved research work.

Further particulars and form of application may be obtained from the Principal, to whom completed forms should be returned not later than 18 March, 1960. (P 283)

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT DISTRICT ENGINEER

TUNBRIDGE WELLS DISTRICT

SALARY £815 x £15—£860 p.a., Class F, Grade 9. Preference given to applicants with technical qualifications up to Higher National Certificate standards and with practical experience of the operation, maintenance and construction of M.V. and 11 kV underground and overhead systems. The successful candidate will be expected to undertake standby duty and to reside in or near Tunbridge Wells.

Applications, quoting ET and naming two referees, to District Manager, Seeboard, Town Hall, Tunbridge Wells, by 14 March, 1960.

GEORGE WRAY,
Secretary.
(P 295)

THE NORTH WESTERN ELECTRICITY BOARD

THIRD ASSISTANT ENGINEER (PLANNING)

SUB-AREA ENGINEERING DEPARTMENT
KENDAL

THE successful applicant will be required to assist in the planning of H.V. and L.V. networks; in the specification of electrical plant; in controlling capital expenditure, and in construction programming and progressing.

Experience in calculations of system load flows, fault levels and relay settings is desirable, and applicants should preferably hold the H.N.C. (or equivalent) in Electrical Engineering, and have had some operational experience in the Electricity Supply Industry.

Salary Scale: £965 x £20—£1,025 p.a., Grade K.10. N.J.B. Conditions.

Applications on a form to be obtained from and returned to the Manager, No. 6 Sub-Area, The North Western Electricity Board, Castle Green, Kendal, by 15 March, 1960. (P 260)

ADMINISTRATIVE COUNTY OF LEICESTER

ASSISTANT ELECTRICAL ENGINEER

£780 to £1,070 according to qualifications. Candidates should be in possession of the Higher National Certificate in Electrical Engineering and be capable of preparing schemes for electrical installations in all types of buildings.

Lodging allowance and removal expenses may be paid by married men.

Apply to County Architect, 123 London Rd, Leicester. (P 284)

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Division

Vacancy No. 52/60.

FOURTH ASSISTANT ENGINEER
(TRANSMISSION)

REQUIRED in the Croydon District for operation and maintenance work on 275 kV and 132 kV overhead lines, cables, transformers, switchgear, etc.

Candidates should possess qualifications leading to Corporate Membership of the I.E.E. and experience on the above equipment would be an advantage.

Salary within the scales £785/£985 or £890/£1,000 including London Allowance according to experience and responsibilities.

Applications giving age, details of experience, qualifications, etc., should be sent to the Personnel Officer, Central Electricity Hse, Lower Ham Rd, Kingston upon Thames, Surrey, to arrive by 16 March, 1960.

W. H. DUNKLEY,
Divisional Controller.
(P 267)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Breadalbane Generation Group

GROUP CONTROL ENGINEER

REQUIRED for the Breadalbane Group Control Centre in Glen Lochay, nr. Killin, Perthshire. Duties are on a shift basis and will be those normally associated with the operation of a group of remotely controlled hydro-electric generating plants and high-voltage switching stations together with load dispatching to manually operated stations. Applicants should preferably have qualifications up to H.N.C. standard.

Salary: N.J.B. Scale, Class G, Grade 7, £965/£1,025 per annum plus 10% Shift Allowance. Superannuation scheme available.

A Board's staff house can be made available to the successful applicant.

Application forms obtainable from the Generation Engineer, Breadalbane Group Centre, Glen Lochay, By Killin, Perthshire, and should be returned within 14 days of the date of this notice. (P 285)

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 40s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

Central Gloucestershire Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER
(CHELTENHAM)

Experience necessary in all branches of distribution work including construction, maintenance and operation of high and low voltage underground and overhead systems and substations, and the planning of system reinforcements and mains extensions. Technical qualifications desirable. Salary £910/£955 per annum (N.J.B. Grade F.7).

FOURTH ASSISTANT ENGINEER
(TELECOMMUNICATIONS)
(HEADQUARTERS)

The successful applicant will be responsible for the installation and maintenance of V.H.F. radio and the internal telephone system, including P.A.X. equipment, alarm and indication systems at major substations and supervisory control systems. Salary £860/£905 per annum (N.J.B. Grade K.12).

FOURTH ASSISTANT ENGINEERS
(CONTROL)
(HEADQUARTERS)

Duties will include assisting the Shift Engineer to carry out all functions associated with a high-voltage system control. Applicants should have had technical training together with experience of switching operations and maintenance work on H.V. distribution equipment. Salary £815/£860 per annum plus £90 per annum shift enhancement (N.J.B. Grade K.13).

THIRD ASSISTANT DISTRICT ENGINEER
(SEVERN VALE)

Duties involve the construction, maintenance and operation of H.V. and L.V. mains and substations, and planning system reinforcements and mains extensions. Technical qualifications desirable. Salary £765/£810 per annum (N.J.B. Grade E.9).

THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER
(DEAN FOREST)

Applicants should have had wide practical experience in the sale and installation of domestic and commercial electrical equipment and the work associated therewith. The successful applicant will be required to assist in all branches of commercial work, including advising consumers on domestic, commercial, and industrial equipment, estimating, contracting work and public lighting. Technical qualifications desirable. Salary £710/£755 per annum (N.J.B. Grade E.10).

Apply, by letter, within 14 days, stating age, experience, present position and salary to Mr S. Raybould, Sub-Area Manager, Midlands Electricity Board, Eastern Ave, Gloucester.

Shropshire and Herefordshire Sub-Area

THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER
(SHREWSBURY)

Applicants should have had a sound technical training with wide practical experience in the sale and installation of domestic and commercial electrical equipment and the work associated therewith. The successful applicant will be required to assist in all branches of commercial work, including advising consumers on domestic, commercial and industrial equipment, estimating and contracting work and rural development. Salary £710/£755 per annum (N.J.B. Grade E.10). Apply, by letter, within 14 days, stating age, qualifications, experience, present position and salary to Mr W. Winwood, Sub-Area Manager, Midlands Electricity Board, Spring Gdns, Ditherington, Shrewsbury.

Wolverhampton and District Sub-Area

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER
(WALSALL)

Applicants should possess a sound technical training and have a wide practical experience of industrial, commercial and

continued in next column

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domestic installations and their electrical requirements. The duties will include advice on utilisation, negotiations with consumers, preparation of estimates, etc., and maintenance of consumer service. Technical qualifications desirable. Salary £1,025/£1,085 per annum (N.J.B. Grade G.6).

GENERAL ASSISTANT DISTRICT ENGINEERS (TWO)
(WALSALL)

Applicants should have had a sound technical training and experience in all branches of distribution work. Technical qualifications desirable. Salary in accordance with N.J.B. Schedule A, Grade G13 (£655/£700 per annum), Grade G12 (£710/£755 per annum), or Grade G11 (£765/£810 per annum), according to qualifications and experience. Apply, by letter, within 14 days, stating age, qualifications, experience, present position and salary to Mr D. Holt, Sub-Area Manager, Midlands Electricity Board, 83 Darlington St, Wolverhampton.

F. W. CATER,
Secretary.
(P 277)

THE NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

1. Area Board Headquarters

(a) ONE FOURTH ASSISTANT ENGINEER, CHIEF ENGINEER'S DEPARTMENT, CONSTRUCTION SECTION, with location at Carliol Hse. Applicants should have H.N.C. in electrical engineering or equivalent qualification and have experience in the construction of overhead and underground networks. Knowledge of 66 kV mains an advantage. Salary: Schedule B, Class AX/DX, Grade 7 or 8, £840/£1,040 or £735/£935, according to qualifications and experience. N.J.B. conditions of service.

2. Tyne Sub-Area

(a) ONE THIRD ASSISTANT ENGINEER, SUB-AREA COMMERCIAL OFFICER'S DEPARTMENT, with location at Sub-Area Headquarters. Applicants will be required to undertake rural development work, particularly the development of agricultural load. Salary: Schedule A, Class L, Grade 10, £1,025/£1,085. N.J.B. conditions of service.

3. Tees Sub-Area

(a) THREE GENERAL ASSISTANT ENGINEERS, SUB-AREA COMMERCIAL OFFICER'S DEPARTMENT. One to be located in each of the following Commercial Districts—Bishop Auckland, Middlesbrough and Redcar. Applicants will be required to supply information and advice to consumers on electricity utilisation and tariffs. Salary: Schedule A, Class L, Grade 18, £610/£655. N.J.B. conditions of service.

(b) ONE THIRD ASSISTANT ENGINEER, SUB-AREA COMMERCIAL OFFICER'S DEPARTMENT, with location at Sub-Area Headquarters. Applicants will be required to undertake general commercial duties. Salary: Schedule A, Class L, Grade 10, £1,025/£1,085. N.J.B. conditions of service.

4. Harrogate Sub-Area

(a) ONE SENIOR DEMONSTRATOR, SUB-AREA COMMERCIAL OFFICER'S DEPARTMENT, with location at Harrogate Service Centre. Applicants should have a certificate of a recognised Domestic Science Training College and E.A.W. Diploma or Certificate. Also considerable experience as a Demonstrator in the Electricity Supply Industry and sales ability for showroom duties.

Salary: N.J.C. Grade 2, £640/£700, N.J.C. conditions of service.

Applications stating age, qualifications and experience to be received by Assistant Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol Hse, Newcastle upon Tyne, within ten days of the appearance of this advertisement. (P 291)

FEDERAL POWER BOARD OF RHODESIA AND NYASALAND

RESIDENT TRANSMISSION MAINTENANCE ENGINEER

APPLICATIONS are invited for the appointment of a Resident Transmission Maintenance Engineer in the Board's Transmission System Maintenance Organisation. The Board is at present constructing 900 miles of 330 kV transmission line and a number of substations.

Applicants should have had substantial experience in the maintenance of high voltage transmission lines and substations and should have had an appropriate technical education. Salary: £1,650 per annum. The successful applicant will be required to contribute to the Board's pension fund. His duties will be concerned with the maintenance of the 330 kV transmission system and he will be expected to take part in the overhaul of electrical plant. The successful applicant will be stationed at Sherwood Control Centre. Housing and hard furniture will be provided by the Board at a reasonable rental in the town of Que Que (where there is a full range of Federal Government Schools), about 16 miles from Sherwood. Transport between Sherwood and Que Que will be provided. The reasonable transfer and removal expenses of the successful applicant and his family to Que Que will be paid by the Board.

Applications giving full details of education, training, experience, age and marital status should be posted so as to reach the Secretary, Federal Power Board, Reliance Hse, Moffat St, P.O. Box 630, Salisbury, not later than 1 April, 1960. (P 276)

ADMIRALTY

REQUIRE ELECTRICAL DRAUGHTSMEN experienced in all Electrical Engineering techniques, preferably with O.N.C. or H.N.C., for appointments in Bath. Candidates must be British subjects, aged 21 and upwards, and have had basic training, including apprenticeship (or equivalent) and drawing office experience in factories or shipyards.

Salary in the range £550 (age 21) to £760 on entry (higher for candidates with wide experience) rising by annual increments to a maximum of £875. Five-day week, 18 days' annual leave. The posts are non-pensionable in the first instance but opportunities for establishment with prospects of promotion may occur at a later date.

Substantial grants towards travelling expenses for all candidates called for interview.

Applications giving age, technical qualifications, details of apprenticeship (or equivalent) and experience, to Secretary of the Admiralty (C.E.II. 114), Empire Hotel, Bath. (P 279)

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern and Yorkshire Region

STATION SHIFT CONTROL ENGINEER
ROTHERHAM POWER STATION

APPLICATIONS are invited for the appointment of Station Shift Control Engineer at Rotherham Power Station.

Applicants should possess a Higher National Certificate in Electrical Engineering or equivalent qualifications, and should have had experience in the operation of a modern power station.

The salary for the appointment will be in accordance with the National Joint Board Agreement, Schedule A, Grade 10, Class H (£860/£905 per annum) plus a 10% allowance for shift duties with a minimum of £90 per annum.

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern and Yorkshire Region, 1 Whitehall Rd, Leeds 1, to whom they should be returned to arrive not later than 14 March, 1960. (P 274)

Box Number replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

Amended Vacancy Notice No. 30/60

ASSISTANT SHIFT CHARGE ENGINEER
DRAKELOW "B" POWER STATION
Vacancy No. 30/60.

APPLICANTS should have received a sound technical training and have had experience in a modern power station. Preference will be given to candidates who possess the Higher National Certificate, or its equivalent.

Salary will be in accordance with Class L, Grade 8 (£1,195/£1,270 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications: 11 March, 1960.

This appointment will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Divisional Establishments Officer, Central Electricity Generating Board, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated.

O. S. WOODS.
Divisional Controller.
(P 273)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Chilterns Sub-Area

WATFORD DISTRICT
TWO FOURTH ASSISTANT ENGINEERS
43/60.N.

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. underground systems including substations. Knowledge of overhead lines would be an advantage.

Salary: N.J.B. Class G, Grade 11 (£765/£810), plus London Allowance.

Apply by letter to the Manager, Watford District, Eastern Electricity Board, The Parade, High St, Watford, by 18 March, 1960.

Norfolk Sub-Area

SUB-AREA HEADQUARTERS
THIRD ASSISTANT ENGINEER
(PLANNING AND DEVELOPMENT)
44/60.R.

Applicants should have had a sound technical training and experience in the planning, construction, operation and maintenance of distribution systems at voltages up to and including 33 kV. Experience in the design of substations and protective gear would be considered an advantage.

Salary: N.J.B. Grade 10, Class K (£965/£1,025).

Apply by letter to the Manager, Norfolk Sub-Area, Eastern Electricity Board, 4 Duke St, Norwich, Norfolk, by 18 March, 1960.

Northmet Sub-Area

(a) TWO THIRD ASSISTANT ENGINEERS
STEVENAGE DISTRICT (Ref. 939)
45/60.R.

(b) FOURTH ASSISTANT ENGINEER
STEVENAGE DISTRICT (Ref. 938)
46/60.R.

(c) FOURTH ASSISTANT ENGINEER
HERTFORD DISTRICT (Ref. 930)
47/60.R.

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems including substations.

Salary: N.J.B., Class G, (a) Grade 9 (£860/£905); (b) and (c) Grade 11 (£765/£810).

Apply by letter by 14 March, 1960, as follows:

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(a) and (b) H. L. Sumner, Manager, Eastern Electricity Board, Walkern Rd, Stevenage, Herts.

(c) W. H. Hatton-Ward, ASSOCIATE I.E.E., A.M.B.I.M., Manager, Eastern Electricity Board, Bridgefoot, Ware, Herts.

ST. ALBANS DISTRICT
SENIOR SERVICE CENTRE ASSISTANT
ST. ALBANS SERVICE CENTRE (Ref. 895)
48/60.R.

Candidates should be capable of taking charge of a Service Centre and handling consumers' enquiries efficiently. They should have had extensive sales and consumer service experience and possess a thorough knowledge of appliances, contracting and the application of standard tariffs. The possession of the E.D.A. Salesmanship Diploma or E.A.W. Certificate will be an advantage.

Salary: N.J.C. Grade 2 (£640/£700).

Apply by letter to F. J. Drake, ASSOCIATE I.E.E., Manager, Eastern Electricity Board, 107 St. Peter's St, St. Albans, Herts, by 14 March, 1960. (P 288)

RHODESIA AND NYASALAND

APPLICATIONS are invited for the post of LECTURER IN ELECTRICAL ENGINEERING SUBJECTS at THE POLYTECHNIC, SALISBURY. The Lecturer will be required to lecture in Electrical Engineering subjects up to general degree standard and, in addition, the electrical content of the City and Guilds Electrical Fitters' Course, for which a sound practical training is essential.

Salary Scale: £1,365 x £52 10s—£1,837 10s. Up to six increments are allowed for previous recognised experience.

The appointment is permanent and pensionable, but consideration would be given to a three-year contract. Passages of the Lecturer, his wife and dependant children will be paid for the outward journey; if the post is filled on contract terms return passages will be paid.

Generous vacation leave is granted. Facilities for the education of children in Salisbury are excellent.

For further information and application forms please apply to: The Education Liaison Officer, Rhodesia Hse, 429 Strand, London W.C.2. (P 256)

FEDERATION OF RHODESIA AND NYASALAND

Federal Power Board

APPLICATIONS are invited for the following appointment:

ASSISTANT PROTECTION ENGINEER
SHERWOOD CONTROL CENTRE
SALARY: £1,750.

Applicants should be Chartered Electrical Engineers or have qualifications leading to Associate Membership of our recognised Engineering Institution, and should be experienced in the testing associated with the commissioning and maintenance of power station and main transmission line plant protection, including modern Feeder, Transformer, Generator and Bus Zone Schemes.

The successful applicant will be stationed at Sherwood Control Centre. Housing and hard furniture will be provided by the Board, at a reasonable rental in the town of Que Que (where there is a full range of Federal Government Schools), about 16 miles from Sherwood. Transport between Sherwood and Que Que will be provided.

The reasonable travelling and removal expenses of successful candidates and their families to Que Que will be paid by the Board.

There is a pension scheme which the successful applicant will be required to join.

Applications giving full details of education, training, experience, age and marital status should be posted so as to reach the Secretary, Federal Power Board, Reliance Hse, P.O. Box 630, Salisbury, Southern Rhodesia, not later than 26 March, 1960. (P 182)

SOUTH OF SCOTLAND ELECTRICITY BOARD

Methods and Operational Research

APPLICATIONS are invited for two superannuable appointments in the Methods and Operational Research Team at Board Headquarters. The duties of the posts include the study and application of methods over the whole field of the Board's activities.

Applicants should be trained as an engineer for post 1, and as an accountant for post 2. Possession of appropriate professional qualifications is desirable. Experience in the Electricity Supply Industry and training in operational research techniques would be an advantage.

(1) THIRD ASSISTANT ENGINEER

Salary and conditions of employment in accordance with Class AX/EX, Grade 5 (£1,090/£1,355 per annum) of Schedule B of the N.J.B. Agreement.

(2) PRINCIPAL ASSISTANT

Salary and conditions of employment in accordance with Grade 7 (£1,070/£1,160 per annum) of the N.J.C. Agreement.

Apply on standard form AE6 available from the Secretary, South of Scotland Electricity Board, Inverlair Ave, Glasgow S.4, not later than 26 March, 1960. Please quote reference No. E12/60. (P 289)

MECHANICAL AND ELECTRICAL ENGINEERS

PENSIONABLE posts for men and women normally under 35 on 1 March, 1960. Applicants must normally have degree in engineering or physics (or Dip. Tech. for some posts) or have passed examinations necessary for A.M.I.Mech.E., A.M.I.E.E., A.F.R.Ae.Soc., etc. Exceptionally, evidence of high professional attainment acceptable in lieu. Practical training and experience required but untrained graduates acceptable for some posts. Men's starting salary (London) from £830 (lower if under 25) to £1,125. Maximum £1,300. Promotion prospects. Write Civil Service Commission, 17 North Audley St, London, W.1, for application form, quoting S/85/60. Closing date 30 March, 1960. Earlier applicants may be interviewed before that date. (P 280)

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern and Yorkshire Region

APPLICATIONS are invited for the following appointments in the Technical Department, Leeds.

FOURTH ASSISTANT ENGINEER
(PROTECTION)

Applicants should possess technical qualifications leading to corporate membership of the I.E.E. and have experience in the application or maintenance of control and protective equipments applied to high voltage transmission and generating systems.

FOURTH ASSISTANT ENGINEER (METERS)

Applicants should possess technical qualifications leading to corporate membership of the I.E.E. and have experience in the assembling and testing of electrical meters and instruments, preferably with summation equipment.

The salary for these appointments will be in accordance with the National Joint Board Agreement, Schedule B, Grade 8 (£735/£960 per annum).

GENERAL ASSISTANT ENGINEERS

Applicants should possess or be completing technical qualifications leading to corporate membership of the I.E.E. and have some knowledge of control and protective equipment applied to high voltage transmission and generating systems.

The salary for these appointments will be in accordance with the National Joint Board Agreement, Schedule B, Grade 9 (£570/£725 per annum).

Forms of application may be obtained from any office of the Board, or from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern and Yorkshire Region, 1 Whitehall Rd, Leeds 1, to whom they should be returned to arrive not later than 11 March, 1960. (P 255)

SOUTH OF SCOTLAND ELECTRICITY BOARD
Edinburgh and Borders Area
THIRD ASSISTANT ENGINEER
(METERS, TEST AND PROTECTION)
SALARY: N.J.B. SCHEDULE A,CLASS L, GRADE 10, £1,025/£1,085 P.A.

APPLICATIONS, on the standard form, obtainable from the undersigned, should be submitted not later than 18 March, 1960.

Conditions of service in accordance with the N.J.B. Agreement for the Electricity Supply Industry and the successful candidate, subject to satisfactory evidence of health, will require to become a contributor to the Board's Superannuation Scheme.

Applicants should hold the H.N.C. (Electrical Engineering) or equivalent, and have some experience in commissioning new substations and routine testing and maintenance of protective gear.

The successful applicant will require to reside within a reasonable distance of Area Headquarters, Edinburgh.

C. H. A. COLLYNS,
Manager.

52 Melville St,
Edinburgh 3. (P 297)

CITY AND COUNTY OF NORWICH
FOREMAN ELECTRICIAN

REQUIRED in the City Engineer's Department to supervise all installation and maintenance work. Wages £12 18s 6d for a 44-hour week.

Applications in writing giving full details of training, experience, past and present employment to the City Engineer, City Hall, Norwich, NOR 01A by 14 March, 1960. (P 293)

SOUTH OF SCOTLAND ELECTRICITY BOARD
Dumfries and Galloway Area
SECOND ASSISTANT ENGINEER
(PROTECTION)
AREA HEADQUARTERS

APPLICATIONS are invited for the superannuable post of Second Assistant Engineer (Protection) at Area Headquarters.

Applicants should have experience in the commissioning and routine testing of protective substation and mains equipment on systems up to 33 kV.

Salary and conditions in accordance with the N.J.B. Agreement, Class G, Grade 7, £965/£1,025 per annum.

Applications, on the standard form, should be sent to the Area Manager, S.S.E.B., Marchmount, Dumfries, not later than 21 March, 1960. (P 294)

SOUTHERN ELECTRICITY BOARD
PERSONNEL OFFICER

APPLICATIONS are invited for the post of Personnel Officer at the Head Office of the Board.

The commencing salary will be in accordance with Grade C, Scale 9 of the National Joint Managerial and Higher Executive Grades Committee (£2,760/£2,960) and the Conditions of Service will be those prescribed by the above Committee and by the Board from time to time.

The candidate should have a wide knowledge, preferably obtained within the Electricity Supply Industry, of all personnel matters, and a considerable experience of the negotiation and application of agreements covering wages, salaries and conditions of service. The duties of the successful candidate will include co-ordinating responsibilities in respect of establishments, education and training and welfare policy.

The successful candidate will, if eligible, be required to contribute to the Electricity Supply (Staff) Superannuation Scheme.

Forms of application, obtainable from the Secretary, should be returned to him in envelopes endorsed "Personnel Officer" and quoting Z.1170, at Southern Electricity Hse, Littlewick Green, Maidenhead, not later than 18 March, 1960. (P 287)

CENTRAL ELECTRICITY GENERATING BOARD
North Eastern and Yorkshire Region
SHIFT CHARGE ENGINEERS
SKELTON GRANGE "B" POWER STATION

APPLICATIONS are invited for the positions of Shift Charge Engineers at Skelton Grange "B" Power Station, Nr. Leeds (capacity 4 x 120 MW—480 MW).

Applicants should have good engineering qualifications and experience in a large power station.

The salary for these appointments will be in accordance with the National Joint Board Agreement, Schedule A, Grade 6, Class L (£1,360/£1,450 per annum) plus 10% allowance for shift duties.

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern and Yorkshire Region, 1 Whitehall Rd, Leeds 1, to whom they should be returned to arrive not later than 19 March, 1960. (P 275)

YORKSHIRE ELECTRICITY BOARD
No. 6 (Hull) Sub-Area
GOOLE DISTRICT
ASSISTANT CONSUMERS' ENGINEER

APPLICANTS should have had a sound technical training and be capable of carrying out negotiations with consumers for new and additional supplies, preparing electrical schemes and specifications, and advising on the utilisation of electricity generally.

Candidates must hold at least the Ordinary National Certificate in Electrical Engineering, or equivalent qualifications.

Salary: N.J.B. Class E, Grade 9, £765 x £15—£810 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than 18 March, 1960. (P 292)

SOUTH OF SCOTLAND ELECTRICITY BOARD
Edinburgh and Borders Area
THIRD ASSISTANT DISTRICT ENGINEER
BORDERS DISTRICT
SALARY: N.J.B. SCHEDULE A, CLASS F, GRADE 9, £815/£860

APPLICATIONS are invited for the appointment of a Third Assistant District Engineer in the Borders District, based on Galashiels.

Conditions of service will be in accordance with the National Joint Board Agreement for the Electricity Supply Industry and the successful candidate will, subject to satisfactory evidence of health, require to become a contributor to the Board's Superannuation Scheme.

Applicants should preferably possess the Higher National Certificate in Electrical Engineering or equivalent qualifications, and have experience in the planning, construction, operation and maintenance of High Voltage and Low Voltage Overhead and Underground Systems, and associated substation plant and equipment.

The successful applicant will require to reside within a reasonable distance of District Headquarters.

Applications on the standard form, obtainable from the undersigned, should be submitted not later than 18 March, 1960.

C. H. A. COLLYNS,
Manager.

52 Melville St,
Edinburgh 3. (P 296)

AN Engineering Insurance Company requires an ENGINEER for appointment as Inspecting Engineer of Electrical Plant. Candidates must possess H.N.C. in Electrical Engineering or equivalent and have served an apprenticeship with a manufacturer of electrical machinery. Apply in own handwriting to The National Boiler and General Insurance Co. Ltd., St. Mary's Parsonage, Manchester 3, giving age (limits 26 to 33) training and experience, academic qualifications and copies of testimonials. Salary: £800/£1,100 progressive. Non-contributory pension scheme. (P 215)

VACANCY IN SALES OFFICE

A man of between 23 to 35 years of age with electrical power engineering experience is required in our Sales Office at New Addington. The applicant should have sound technical knowledge and anyone taking H.N.C. course would be of the approximate standard. The job is to deal with commercial and technical correspondence concerning capacitors.

It is not expected that a candidate would have specialised knowledge of the product, but this would be acquired in the course of work if the individual has a suitable technical background.

There are excellent prospects for steady progress for the right man. Starting salary according to age and experience. Applications giving age, education and experience to:

The Sales Manager,
A. H. HUNT (CAPACITORS) LIMITED,
Vulcan Way, New Addington,
Croydon, SURREY.

(P 258)

ASSISTANT ELECTRICAL DESIGN ENGINEER required by Consulting Engineers. Applicants shall have drawing office experience and be familiar with I.E.E. Rules and Regulations and fundamental principles of artificial lighting and have O.N.C. Reply in writing giving details of past experience and age to: Pashler and Partners, 73 Southampton Row, London W.C.1. (P 270)

DRAUGHTSMEN ELECTRICAL AND MECHANICAL required for Engineering Consultants. Knowledge of power station work an advantage. Positions permanent, pensionable, five-day week, free lunches. Write Personnel Department, Ewbank and Partners Ltd., 10-11 Grosvenor Pl, S.W.1. (P 237)

HOWDEN

James Howden and Co. Ltd. have vacancies for additional

PROJECTS ENGINEERS (ELECTRICAL)

to handle Contracts work in the Precipitator Section of their Technical Engineering Department. Essential qualifications are a Degree or H.N.C. in Electrical Engineering with good experience in industrial installation, drawing office and/or contracts engineering work. Duties cover preparation of tenders, and administration of contracts for large electro precipitator installations. Good general conditions of employment and salary according to age, qualifications and experience. *Applications should be sent to the Personnel Manager, James Howden and Co. Ltd., 195 Scotland St, Glasgow C.5, giving full details of career to date.*

(P 262)

AEI

ASSOCIATED ELECTRICAL INDUSTRIES LIMITED

DESIGN AND DEVELOPMENT ENGINEERS

Associated Electrical Industries have vacancies for design and development engineers in the Instrument and Meter Department of their Instrumentation Division in Manchester.

The qualifications required are a degree or H.N.C. and some knowledge of electronics is desirable.

Preference will be given to applicants who have had some previous experience in light current engineering, either with servo mechanisms, or protective and automatic control schemes.

Applicants without these qualifications, but who have had some approved practical experience in laboratories or test departments would be favourably considered.

Please write for application forms quoting reference T.14 to:

The Personnel Manager,
ASSOCIATED ELECTRICAL INDUSTRIES (MANCHESTER) LTD.
Trafford Park,
MANCHESTER, 17.

(P 259)

ENGINEERS required for site testing and commissioning of switchgear installations up to and including 33 kV. Single men preferred and successful applicants will be required to travel throughout U.K. and possible abroad. Applications giving technical qualifications, experience, age and salary required to Box No. 7763, Electrical Times. (P 304)

ELECTRICAL CONTRACTORS require an estimator for industrial and commercial installations. Only fully experienced men who are conversant with all types (including FLP) need apply.—Please write stating experience, qualifications and salary required to Box No. 7753, Electrical Times. (P 263)

DEPUTY CHIEF OF TEST AND INSPECTION

for work in connection with the manufacture of large E.H.V. power transformers and associated gear.

Duties involve both development and production testing including impulse testing.

Applicants should preferably have had experience in one or more of the above categories of testing and be used to supervising test and inspection personnel.

Minimum qualifications: degree standard or equivalent. Salary commensurate with experience and qualifications.

Write, in confidence, stating full personal particulars, experience and present salary level to Personnel Manager, Fuller Electric Ltd., Fulbourne Rd, London E.17.

(P 261)

JOHNSON & PHILLIPS LIMITED

One of the major independent companies in the electrical industry invite applications for the following positions.

CHIEF RUBBER AND PLASTIC TECHNOLOGIST

In the Cable Test and Research Department. Successful applicant will be responsible for supervision of all research and development of rubber and plastic insulated cables.

CABLE ENGINEER for Cable Test and Research

A good all-round experience in the manufacture, design and installation of power cables for all voltages is desirable, and experience in the design of cable accessories would be an advantage.

These appointments carry a good salary and prospects and there is a generous pension scheme.

Applications giving details of qualifications and experience to the Employment Manager, Johnson and Phillips Ltd., Victoria Way, London S.E.7. (P 300)

CHIEF SWITCHGEAR ENGINEER required for large organisation. Only applicants with first-class qualifications in technical and administrative capacity should apply for this position. The successful applicant will be one of the top executives in a large expanding organisation. Applicants should give full information regarding age, experience, technical background and length of service in responsible positions. All applications will be treated in strict confidence. —Box No. 7743, Electrical Times. (P 216)

CROMPTON PARKINSON (CHELMSFORD) LTD. invite applications for appointments in the Machine Department, Estimating Section, at their Chelmsford Works. Applicants should have had a sound technical training and some experience in handling enquiries for a.c. and d.c. rotating plant and control gear up to 1,500 h.p./kW capacity. Congenial working conditions with excellent opportunities for advancement. Five-day week. Superannuation scheme.—Apply in confidence stating age, whether married or single, with details of experience and training to Personnel Officer, Crompton Parkinson (Chelmsford) Ltd., Chelmsford. (P 198)

ASSISTANT ELECTRICAL ENGINEERS

required by

WOODALL-DUCKHAM CONSTRUCTION CO., LTD.

Age 26-30. Qualifications to H.N.C. or near equivalent essential; Graduateship of Institution of Electrical Engineers preferred. Some experience required in preparation of wiring diagrams for industrial power and lighting installations and in technical correspondence; also, preferably, knowledge of motor-control gear sequence interlocking schemes, etc.

Salary in accordance with qualifications and experience. Good working conditions. Staff Bonus. Pension and Insurance Schemes. Five-day week. Canteen.

Apply in writing stating age, education and experience to the Personnel Officer, Woodall-Duckham Construction Co. Ltd., 63-77 Brompton Rd, London S.W.3. (P 307)

South Western ELECTRICITY

SOUTH WESTERN ELECTRICITY BOARD

Applications are invited for the following position:

Branch Manager, Lynton, Barnstaple District

Salary within Class E, Grade 7, £860 x £15—£905 per annum—of the N.J.B. Agreement.

The candidate appointed will be responsible to the District Manager, Barnstaple, for the efficient operation of the Branch.

Duties include commercial development, consumer service and sales and contracting of the Branch supply area; operation and maintenance of the distribution system and such constructional work as may be delegated. He will be required to undertake standby duties.

Technical qualifications equivalent to the Higher National Certificate in Electrical Engineering, an all-round Commercial and Engineering experience and the ability to control staff will be an advantage; possession of a current driving licence is desirable.

Applications for the above post to be made on Standard Form AE6/ACT obtainable by postcard only from the District Manager, South Western Electricity Board, 7 Cross St, Barnstaple, Devon. Closing date for receipt of completed applications is 19 March, 1960. (P 299)

ELECTRICAL CONTRACTORS in Surrey require an ESTIMATING and SUPERVISING ENGINEER for contracts up to £5,000. Write in confidence, stating experience and salary required to Box 7731, Electrical Times. (P 186)

ELECTRICAL TESTERS. The type of men we require should have previous experience of testing Control Gear, be capable of working with the minimum of supervision, and have a clear understanding of the principles of electric motors. Five-day week, canteen, pension fund. Apply in writing stating age, previous experience, etc., to Personnel Officer, Dewhurst and Partner Ltd., Inverness Rd, Hounslow, Middx. (P 141)

SENIOR TRANSFORMER DESIGNER

Required by

A well-established Company in the South of England.

Applicants should have Degree or H.N.C. and preferably some years' experience with transformers up to 20,000 kVA and 66 kV, with on-load tap changing gear.

The post carries a progressive salary combined with excellent conditions of employment including superannuation.

Written application giving full details of age, nationality, qualifications, experience and salary required, to:

Box No. 7765, Electrical Times.

(P 306)

MINISTRY OF WORKS

Required

ELECTRICAL ENGINEERING DRAUGHTSMEN

For employment mainly in London, Leeds, Reading and Manchester on design of lighting, power and special type installations and site distribution schemes for all classes of Public and Industrial Building.

GENERAL CONDITIONS

Salary range £570 (age 21) to £900 per annum in London (slightly less elsewhere). Starting pay according to age and experience with maximum normally £782 per annum (London) for age 28 and over. Five-day week, 3½ weeks' annual leave initially and concessions for higher technical training in approved cases. Prospects of promotion to posts with salaries £1,055 per annum and above. Opportunities for permanent posts leading to pensions, non-contributory.

QUALIFICATIONS

Technical Education to O.N.C. or equivalent standard.

APPLICATIONS

State age, experience, training and qualifications to The Chief Engineer, Ministry of Works (S), Room 435, Abell Hse, John Islip St, London S.W.1.

Interviews at Regional Offices where possible.

(P 214)

ELECTRICAL ENGINEER required for Glasgow Office staff. Applicants should have completed post graduate training in manufacture of electrical machines. Progressive salary with non-contributory pension. Applications stating age, nationality, qualifications and experience to British Engine Boiler and Electrical Insurance Co. Ltd., 98 West George St, Glasgow C.2. (P 301)

J. & P. CAPACITOR DEPARTMENT

Johnson and Phillips Ltd. have a vacancy in their Capacitor Department—Test Section—for a YOUNG MAN holding H.N.C. Good opportunity for a progressive man to work in a modern well equipped factory. Excellent canteen facilities, pension scheme, etc. Applications giving full particulars of training and experience together with age to: Employment Manager, Johnson and Phillips Ltd., Charlton, London S.E.7. (P 269)

KNOBS AND HANDLES.—Experienced manager required for new department making knobs and handles. This new section has many machines already installed. Person appointed must take complete charge. Please write fully VAB Products Ltd., 48 Albemarle St, London W.1. (P 195)

BRITISH INSULATED CALLENDER'S CONSTRUCTION CO., LTD

have vacancies in their Overhead Line Contracts Department in London for:

ASSISTANT DESIGN ENGINEERS

Work involves structural design aspects of Electrical Transmission and Distribution Lines. Previous experience desirable, although not essential, but structural background up to H.N.C. standard an advantage. After appropriate training successful applicants will be expected to conduct technical correspondence and negotiations. These posts carry progressive responsibility.

Attractive salaries will be offered to suitable applicants. Pension Fund; Staff Canteen; Five-day week.

Apply in writing stating full details to Staff Officer, above Company, at 30 Leicester Sq, London W.C.2.

(P268)

HARTLEY ELECTROMOTIVES LTD., SHREWSBURY, require the services of ELECTRICAL ESTIMATOR or ELECTRICIAN willing to train for this progressive position. Good salary dependent on experience, staff privileges, modern office with ideal working conditions. Pension Scheme. Housing assistance if required. Apply: General Manager, Wiring Systems Division. (P 286)

ELECTRICAL SALES ENGINEERS

Bruce Peebles and Co. Ltd., East Pilton, Edinburgh 5, have vacancies for experienced Inside Transformer Sales Engineers to prepare home and export tenders. H.N.C. standard required. 5-day week. Staff pension scheme. Housing assistance given if necessary.

Apply, giving details of experience, to Divisional Director (Transformers) at the above address.

(P 238)

LIGHTING FITTINGS DESIGN.—Versatile Designer/Draughtsman with practical knowledge of manufacturing technique required for drawing office of old-established company in Central London. Diverse range of industrial, commercial and specialised equipment. Contributory pension scheme.—Box No. 7755, Electrical Times. (P 264)

OUTSIDE TECHNICAL ASSISTANTS required for London, Birmingham, Bristol and possibly other parts of the country to sell switchgear and transformers to Industrialists, Contractors, etc. Switchgear trained men preferred. Apply with full particulars and salary expected to Home Sales Manager, South Wales Switchgear Ltd., Rex Bldgs, Wilmslow, Ches. (P 239)

AUSTRALIA

Applications are invited for a Transformer Coil Winder with experience in the winding of all types of transformer coils. Apprenticeship in the transformer field is required and knowledge of high voltage work necessary. Housing will be provided to successful applicant. Salary in the £1,200 a year range.—**Write Box No. 3124, c/o CHARLES BARKER AND SONS LTD., Gateway Hse, LONDON, E.C.4.**

(P 266)

APPOINTMENTS WANTED

QUALIFIED ELECTRICAL ENGINEER (28), returning to India and keen to take up responsible duties, wishes to discuss possibilities with interested organisations. Hard-working and years of experience with British manufacturers. Please write for details.—Box No. 7707, Electrical Times. (P 95)

BUSINESS OPPORTUNITIES

ENGINEER, B.Sc.(ENG.), A.M.I.E.E., with wide electrical and executive experience, has capital and seeks directorship.—Box No. 7757, Electrical Times. (P 265)

PROGRESSIVE and expanding Electrical Company with small South Coast factory needs additional DIRECTORS, both technical and sales. Investment of £2,000/£3,000 preferred. Write, Secretary, J. Bull Electrical Ltd., Sutton Rd, Eastbourne. (P 217)

PATENTS

THE Proprietors of British Patent No. 732,428 for "IMPROVEMENTS IN OR RELATING TO CARTRIDGE-TYPE FUSIBLE ELECTRIC CUT-OUTS" desire to enter into negotiations with a firm or firms for the sale of the patent or for the grant of licences thereunder. Further particulars may be obtained from Marks and Clerk, 57 and 58 Lincoln's Inn Fields, London W.C.2. (P 271)

THE Proprietors of British Patent No. 773,570 for "IMPROVEMENTS IN PROJECTILE FUSES" desire to enter into negotiations with a firm or firms for the sale of the patent or for the grant of licences thereunder. Further particulars may be obtained from Marks and Clerk, 57 and 58 Lincoln's Inn Fields, London W.C.2. (P 302)

AGENCIES

NORTHERN IRELAND.—Well established Manufacturer's Agent, live connections with Electricity Boards, Corporations, Wholesalers and Electrical Contractors, requires additional lines. Water heating, cookers and other appliances. Storage available.—Box No. 7759, Electrical Times. (P 272)

TECHNICAL REPRESENTATIVE/AGENT with sound Electrical training, good connections in Yorkshire and West Africa; wishes to further Electrical manufacturers interests in Hull and E. Yorks, on commission and/or retainer basis.—Box No. 7747, Electrical Times. (P 242)

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WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper Ltd., 17 Brady St, Bethnal Green, E.1. (P 1)

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A.C. and D.C. MOTOR REWINDS and REPAIRS. Prompt service, fully guaranteed. Edgware 5566 (4 lines). — Service Electric Co. Ltd., Stanmore, Middx. (P 2)

Classified Adverts Continued on Page 54

treatment for apparent death from ELECTRIC SHOCK

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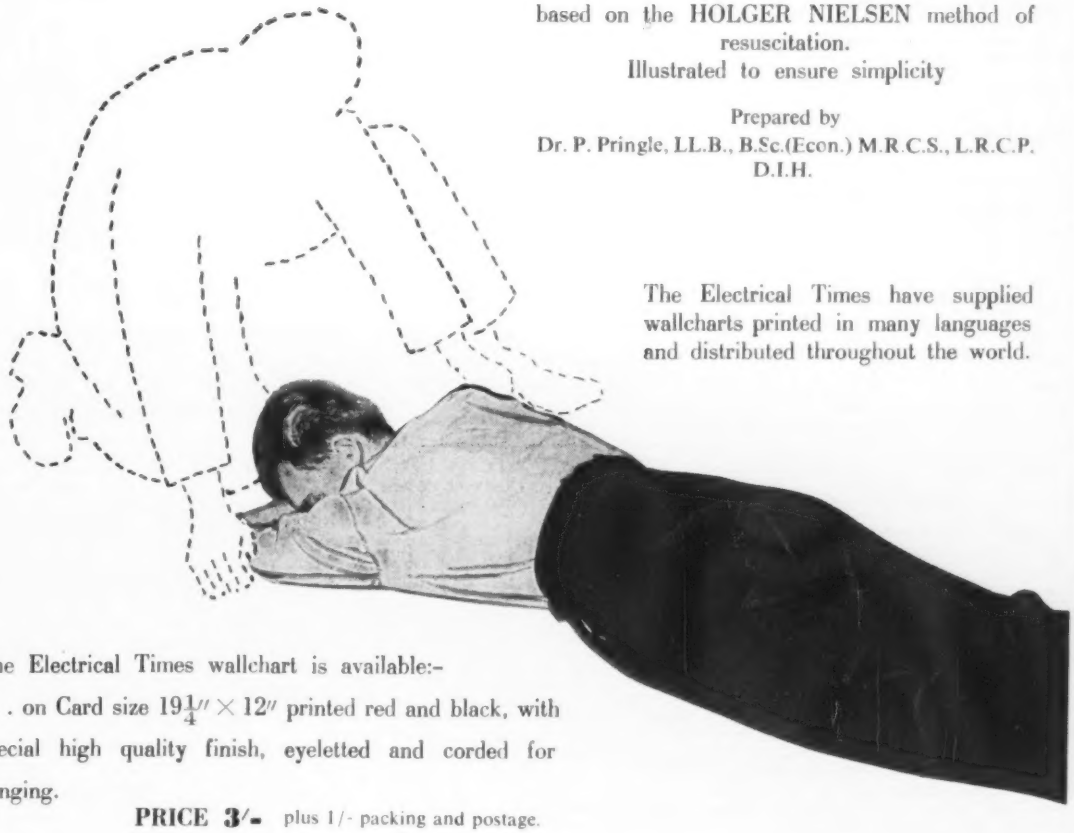

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A.A. ELECTRICAL CO. for A.C.-D.C. MOTORS, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—Chi 5105, 67 Rothschild Rd, W.4. (P 3)

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FOR LIGHTING GLASS, contact Stevens and Williams Ltd., Tipton, Staffs. Anything in Opal, decorated, pressed or blown, for domestic, commercial and street lighting. Largest exclusive lighting glassworks in the world. Buy British. (P 11)

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PURLEY CHOKES AND BALLASTS. Our 80-W tapped h.p.f. ballast with starter switchgear-holder incorporated is proving itself the most popular unit. Suitable for most fittings, 57s 6d each subject. —F. W. Blanshard Ltd. (Dept. E.T.), Purley, Surrey. Uplands 4818/9. (P 6)

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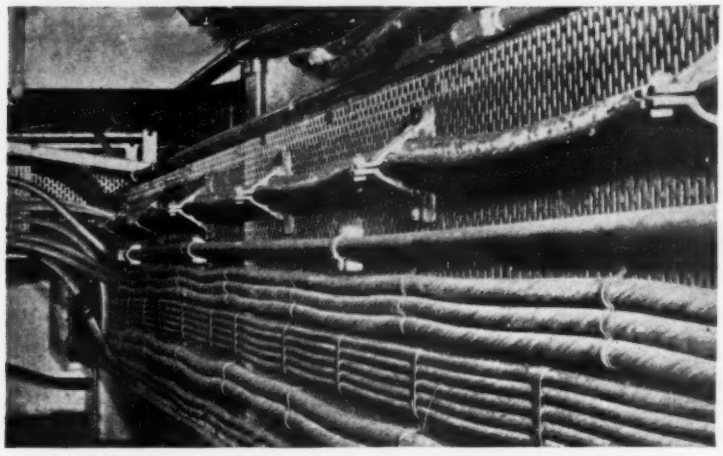

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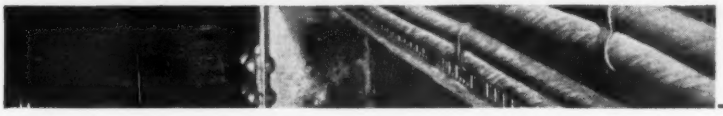

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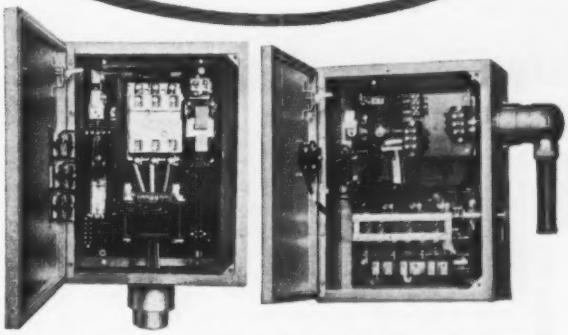

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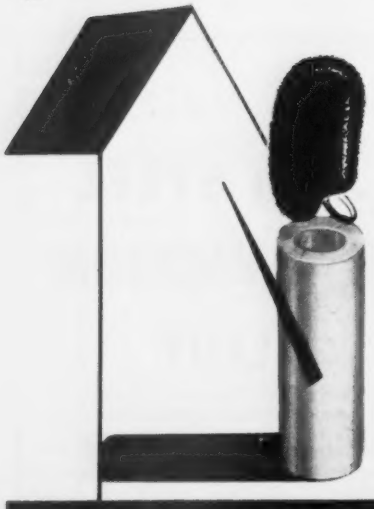

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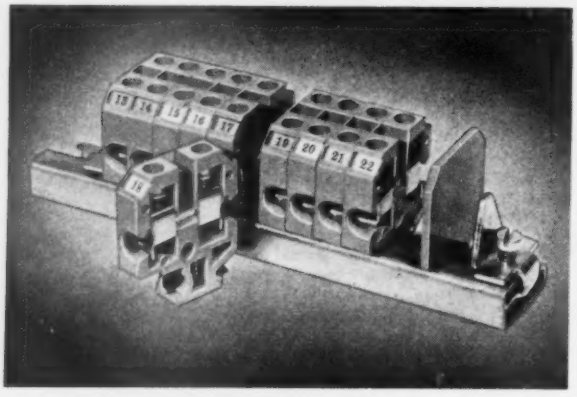

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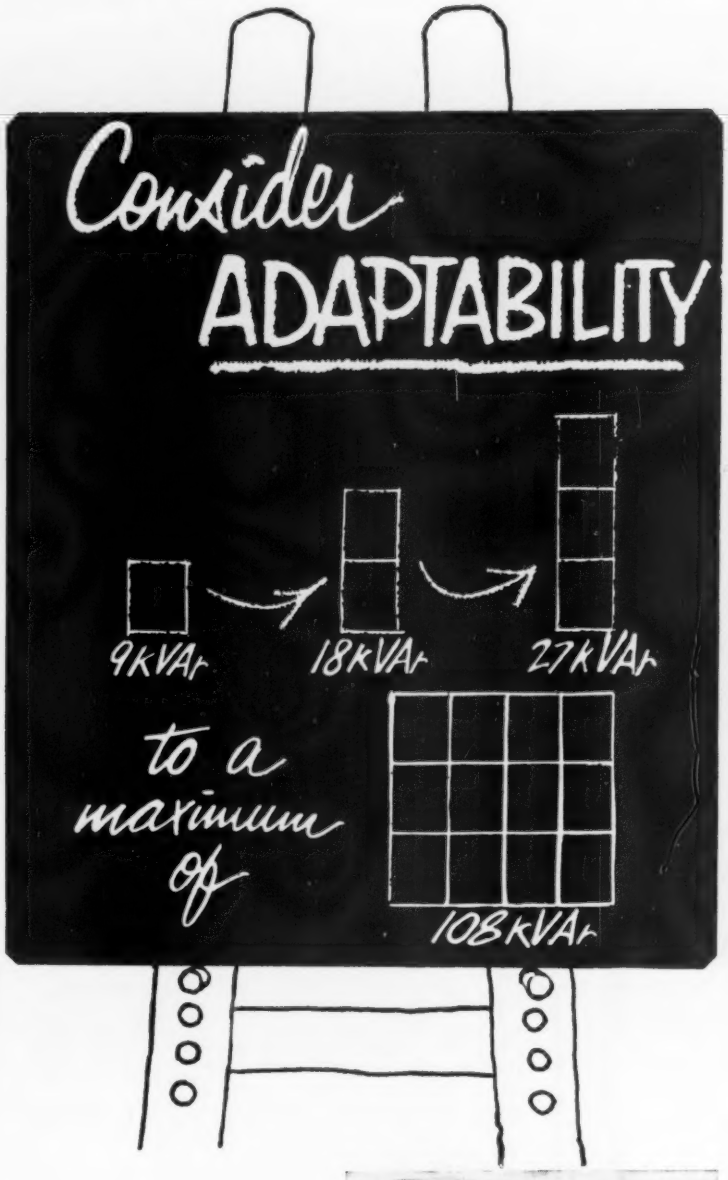

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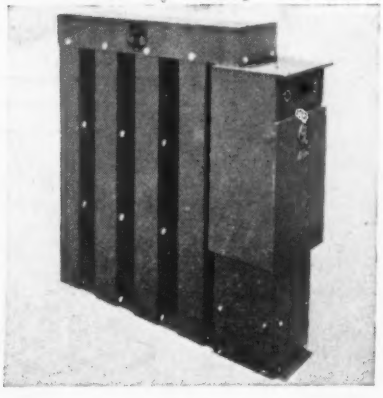

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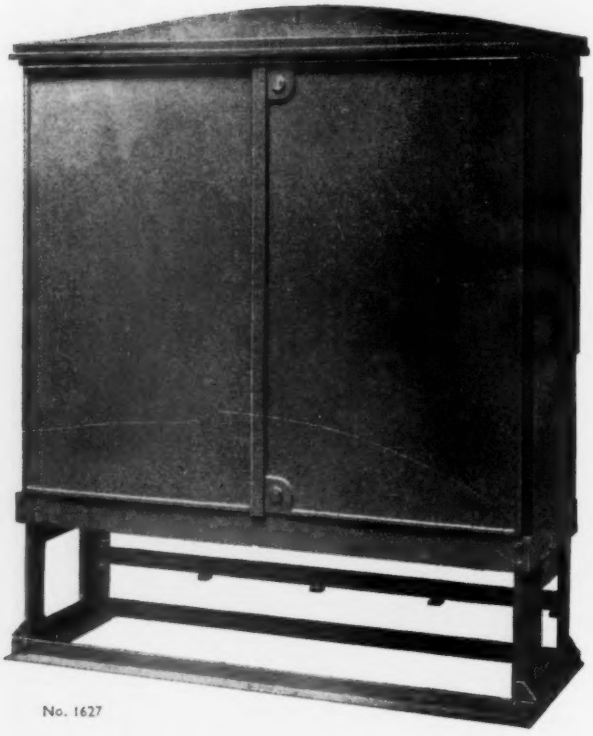

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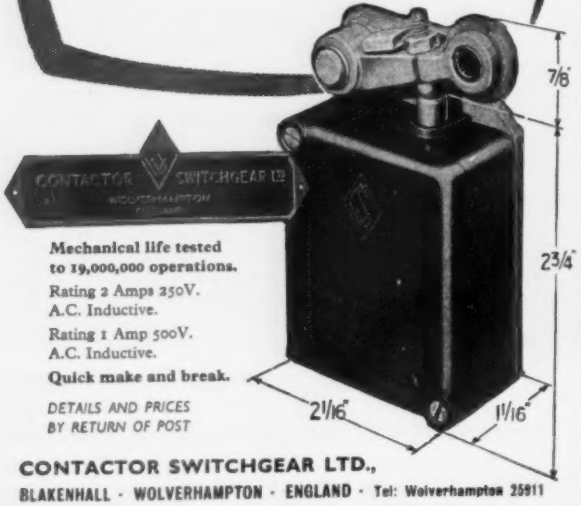

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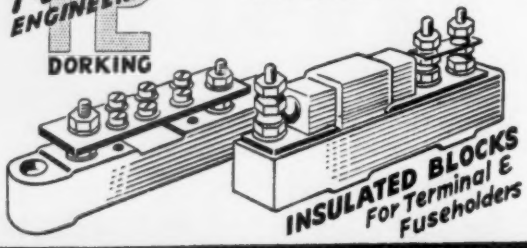

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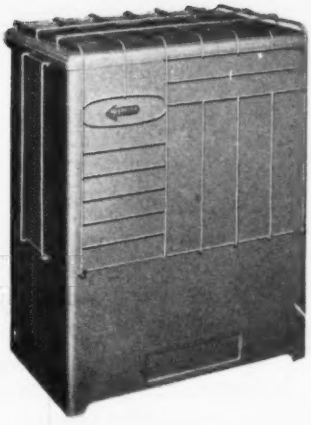

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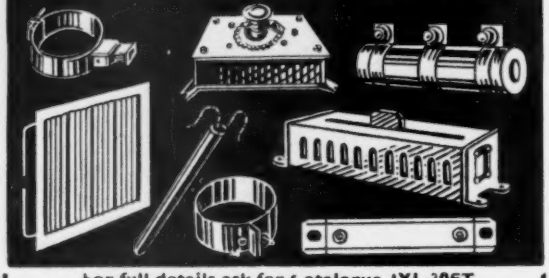

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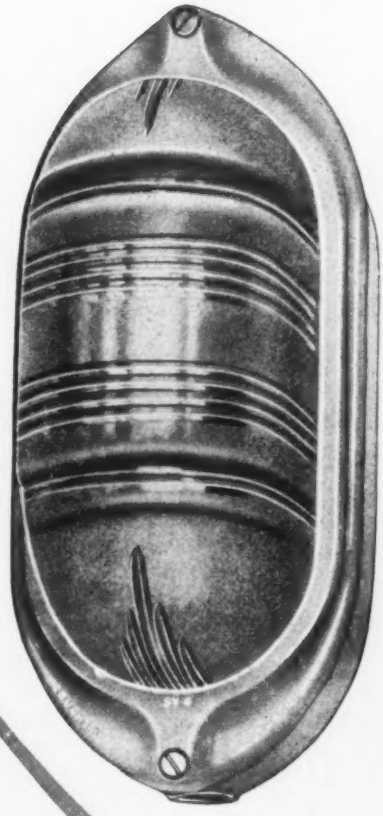

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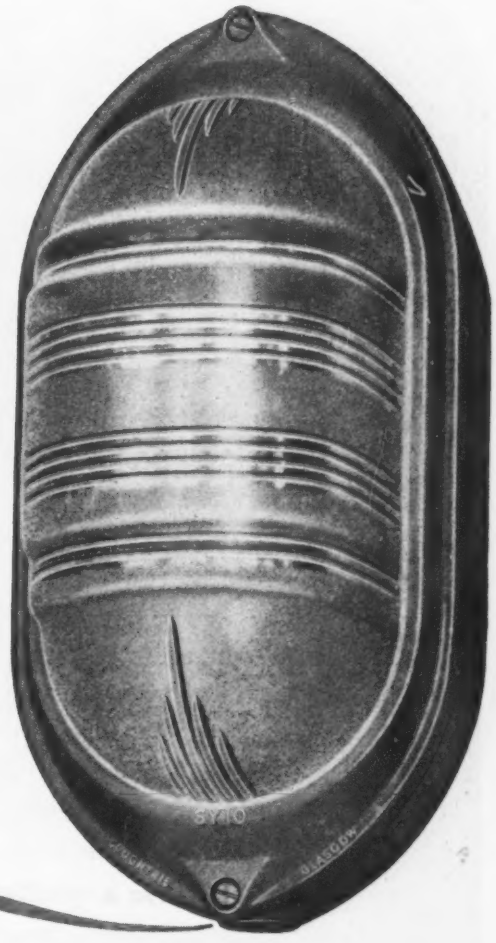

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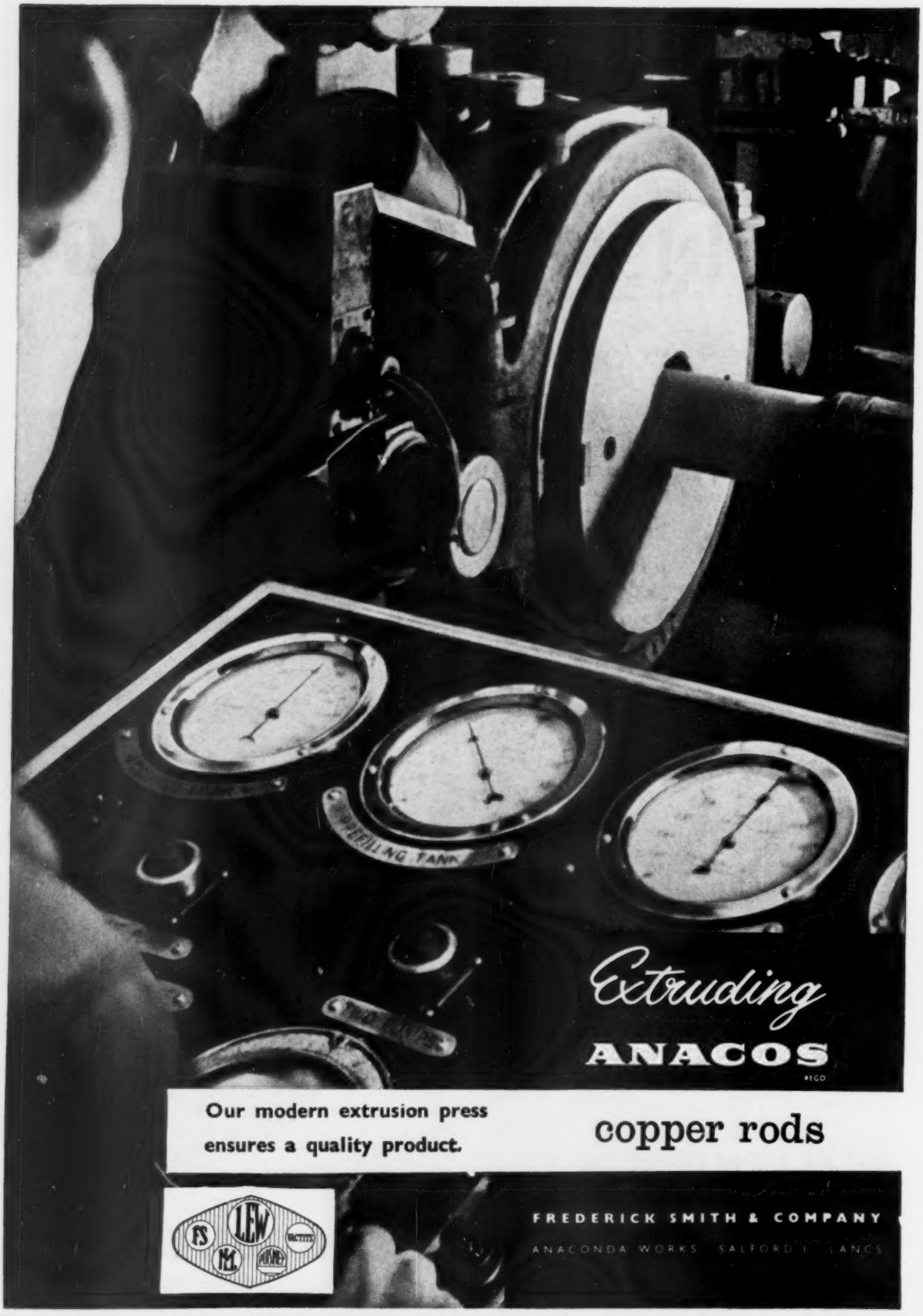

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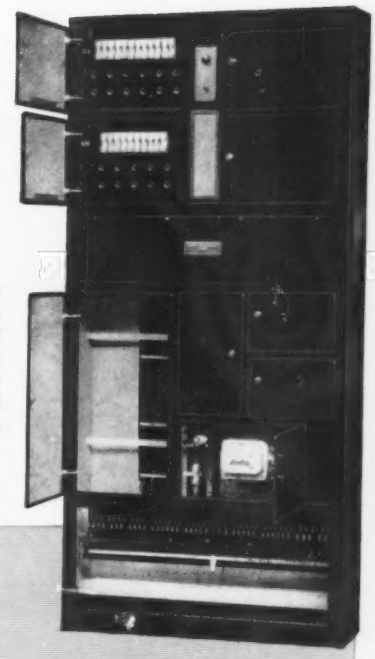
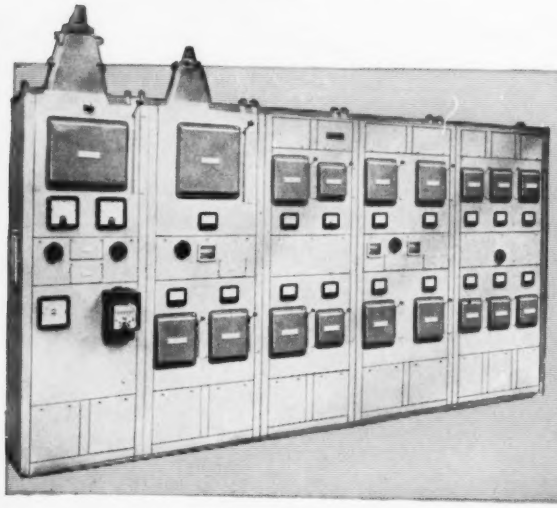
An unusual Cubicle Board (right) which provides a variety of lighting fuseboards with tumbler switch panels. It is installed in St. George's Chapel, Windsor.





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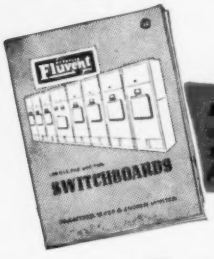
Installed in a modern manufacturing undertaking, this Board (above) protects one 300 amp. eight 100 amp. and eight 60 amp. 3 phase 4 wire outgoing circuits, and the incoming Cubicle on the left is provided with a 600 amp. main switch and metering facilities.

A compact Board (right) protecting one 300 amp. and two 60 amp. 3 phase 4 wire circuits and six 30 amp. single phase and neutral circuits, all under the control of a 600 amp. T.P. and Neutral incoming main switch.



Publication SB3 illustrates and describes a selection of Cubicle and Unit Type Switchboards. A copy will be forwarded to you on request.

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